creative computing

June 1979
vol 5, no 6
$2.00

the #1 magazine of computer applications and software

Computers come to Sesame Street

Computer Graphics on printers and plotters

Using Basic Strings

SYSTEMS - SOLUTIONS

If you have a problem that can be solved by a computer—we have a systems solution.

- Two central processors with maximum RAM capacities of 56K and 384 K bytes
- Three types of disk drives with capacities of 175K, 1.2M and 16M bytes
- Two dot matrix printers with 80 and 132 line capacity
- A Selectric typewriter interface and a daisy wheel printer

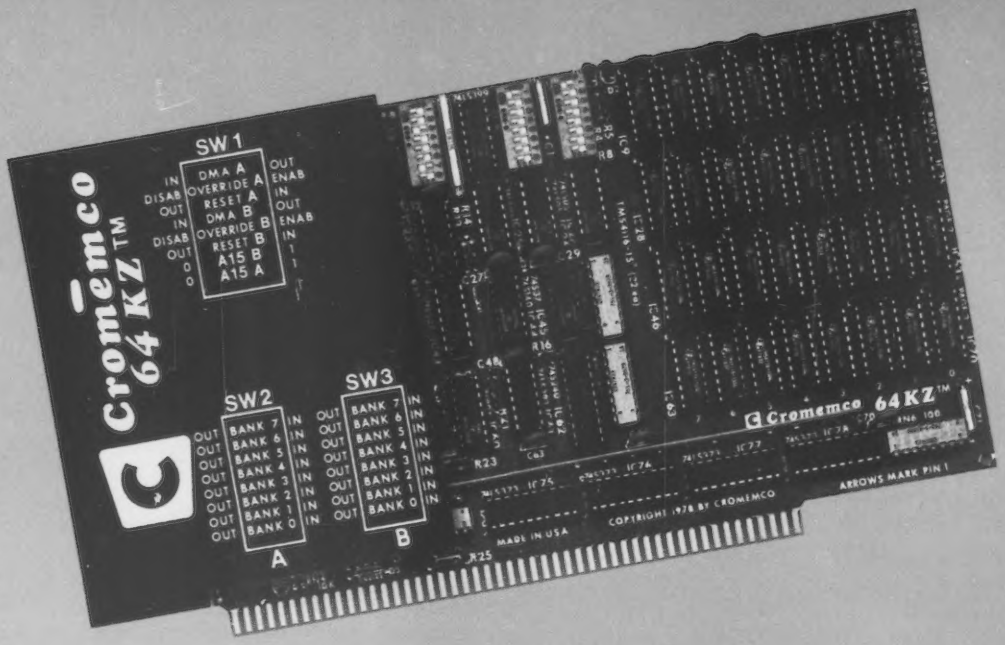
Match these to your exact need, add one or more of our intelligent terminals and put together a system from one source with guaranteed compatibility in both software and hardware.

Southwest Technical Products systems give you unmatched power, speed and versatility. They are packaged in custom designed woodgrain finished cabinets. Factory service and support on the entire system and local service is available in many cities.

SWTPC

SOUTHWEST TECHNICAL PRODUCTS CORPORATION
219 W. RHAPSODY
SAN ANTONIO, TEXAS 78216 (512) 344-0241

CIRCLE 183 ON READER SERVICE CARD



You can do surprising things when you have 64 kilobytes of fast RAM on one card

4 MHz FAST—AND EXPANDABLE

Here's 64 kilobytes of memory on one RAM card. Yes, we mean 512K bits of read/write memory on this single card.

And, yes, we mean it's fast. With 150-nanosecond chip access times — so the card can operate in fast Z-80 systems with no wait states. Repeat, no wait states.

EXPANDABLE ON TWO LEVELS

Not only does the new Model 64KZ give you a large, fast RAM but it is expandable on two levels.

First, through our Cromemco Bank Select feature, you can expand to 512 kilobytes in eight 64K banks.

Or, with our Extended Bank Select feature, you can expand memory space to as much as 16 megabytes.

This expandability we call your obsolescence insurance.

The legend on the card's heat sink is an easy reference for address and bank selection.

BENCHMARK IT

Obviously, the speed and memory capacity of this new card give you a lot of power.

You can see that for yourself in our new 7-station Multi-User Computer System which uses these Model 64KZ cards. This S100-bus system outperforms the speed of many if not most timesharing systems of up to 10 times the Cromemco price.

And yet where some of these much more expensive and cumbersome systems clearly slow to a snail's pace when timesharing, the Cromemco system using Bank Select switching runs surprisingly fast.

SEE IT NOW

See the new Model 64KZ at your computer dealer now. Study the literature on it. See how for only $1785 you can get around that ever-present barrier of memory that's too little and too slow.

For high reliability all Cromemco memory cards are burned in at the factory in these temperature-controlled ovens.

Cromemco Multi-User System shown with 7 stations

Cromemco
incorporated
280 BERNARDO AVE., MOUNTAIN VIEW, CA 94040 • (415) 964-7400
Tomorrow's computers now
CIRCLE 138 ON READER SERVICE CARD

MicroPro International Corporation

The Producers of WORD-MASTER™ and SUPER-SORT™

Proudly Present

WORD-STAR™

Here it is! The most complete, totally integrated, word processing system software you've ever seen on a microcomputer. WORD-STAR™ really shines in ease of use, with its unique, dynamically activated menu scheme that allows typists to become word processing operators in minutes instead of weeks. For only $495, your 8080/8085/Z-80 *with any CRT device* becomes a word processing system with the features of a Lanier, Wang, Vydec, Xerox, etc, for far less cost.

Features like ON-SCREEN VISUAL TEXT COMPOSITION, with word wrap, plus dynamic justification and remargination. Imagine being able to type without hitting RETURN, and as WORD-STAR™ moves you to the next line, the preceding line is redisplayed, justified to your left and right margins! Center a line with a keystroke! Set **BOLDFACE** and/or underline even in mid paragraph! Rejustify text to new margins, on-screen, at will!

DYNAMIC PAGINATION shows the printer page breaks during text entry, correction, or review. Dot commands control vertical page layout, CONDITIONAL PAGINATION, page HEADINGS, page NUMBERS, etc. The integrated PRINT COMMAND can print selected pages only, pause between pages for letterhead loading, and drive any CP/M* list device. WORD-STAR™ runs with the CP/M interfaced printer and terminal of your choice.

SPECIFICATIONS: status line showing page, line, column of cursor; variable menu suppression for experienced operators; dynamic display of text during entry or on call permits CRT preview of printed copy; full disk buffering (document sizes up to diskette capacity); multiple file/disk edits in a session; CP/M file compatible — also useful for data entry, editing programs, etc. Commands include: cursor up/down/left/right; scroll line/screenful, up/down, once/variable rate; insert/overtype; delete character/word/line left/right/entire; variable margin set/release; set/clear tab stops; justify/ragged right; block move/copy/delete; search/replace once/n times/global/selective/whole words only; write to/read from additional files; set/go to any of 10 place markers. Additional support provided for CRT's with inverse video/dual intensity, line insert/delete, and erase to end of line. Dialog interface for easy installation. AND MORE!

Registered WORD-MASTER™ users can get a $100 discount from us or your participating dealer when upgrading to WORD-STAR™. Offer good for a limited time only.

WORD-STAR™ operates with any CP/M* operating system, 32K, and either a memory mapped video board or any CRT TERMINAL with cursor control and clear screen (Hazeltine, Lear-Siegler, Soroc, Microterm, Hewlett Packard, Infoton, Beehive, Processor Tech VDM, IMSAI VIO, SD Systems, Altos, Dynabyte, GNAT, etc). We ship on 8" IBM, Micropolis II, or Northstar diskette.

Other fine MicroPro Products include:

	Software/Manual		Software/Manual
Word-Star™	$495/25	Super-Sort™ I	$250/25
Word-Master™	$150/25	Super-Sort™ II	$200/25
Tex-Writer™	$ 75/15	Super-Sort™ III	$150/25

MICROPRO INTERNATIONAL CORPORATION
1299 4th Street, San Rafael, California 94901
Telephone (415) 457-8990 Telex 340388 Dealer/OEM inquiries invited

"PROFESSIONAL QUALITY SOFTWARE YOU CAN COUNT ON, NOW"

See Demonstrations at NCC. Personal Computing Booth 42

*CP/M is a trademark of Digital Research Corp.

CIRCLE 169 ON READER SERVICE CARD

In This Issue

articles

22 **Sesame Place** ..... Ahl
A new theme park...with computers

62 **Robot Rover** ..... Chesson
Your Own Pavlovian Pooch

66 **Mystery Shopper** ..... Rust
We shop for a computer

78 **Halve Your Job** ..... Page
Less work...and more computers

82 **Microcomputers in the Hospital** ..... Goff
Dedicated systems throughout

SPECIAL GRAPHICS FEATURES

32 **Computer Graphics With the Diablo** .. McDonough
Accurate plotting without graphics mode

36 **Pi to 8182 Places** ..... Rogowski
Amazing output from a drum plotter

38 **Dramatic Graphics the Bit Pad Way** ..... Blewett
Details on using a bit pad

46 **Computerized Clay** ..... Blakely
New tool for the sculptor

48 **The Incredible Printing Machine** ..... Craig
Music on the Malibu line printer

50 **The USS Enterprise** ..... Wilczynski
Two images of our favorite space vehicle

56 **Circles, Spirals, and Polygons** ..... Dickerson
Amazing graphics from an HP 7202

60 **The Majic Wand** ..... Felsenstein
Bob Freedman's amazing invention

applications - games

70 **Billing Program** ..... Barbier
For the Sorcerer

86 **Strings and Things** ..... Badgett
Basic string manipulations

92 **GREED** ..... Ragsdale
Game playing program with adjustable skill level

94 **Two-million Frantic Frenchmen** ..... Winkless
A study in probability

96 **Phonetically Speaking** ..... Rogers
TRS-80 Voice Synthesizer

104 **Inspector Clew-So** ..... Carlson
Find the meanie culprit

108 **Inkblot** ..... Costello
A new game to produce patterns

110 **Puzzles & Problems** ..... Townsend
Seven new ones to tickle your brain

evaluations & profiles

28 **HIPLOT Digital Plotter** ..... Heuer
Can you use a low-cost plotter?

76 **Name and Address System** ..... VanHorn
Structured Systems' NAD Programs

102 **ALF/Apple Music Synthesizer** ..... North
A user-oriented music package

fiction & foolishness

112 **Opening Move** ..... Baldwin
A serious game

116 **Nostalgia in Coin-Op Games** ..... Ahl
When a penny really bought something

departments

6 **Editorial** ..... Craig
Ten years from now

10 **Et Cetera** ..... Et al
Would you believe 8 typefaces on one page?

12 **Input/Output** ..... Readers
Games, Go, PET disks, TRS-80 frustration

18 **Random Ramblings** ..... Craig
Vector Graphics, Dropouts, CAI

118 **Software Copyright Forum** .....
Ahl, North and readers sound off

124 **TRS-80 Strings** ..... Gray
Cassette Interface, 80-US, Short programs

128 **Compleat Computer Catalogue** .....
99 New products!

156 **Book Reviews** ..... Gray
We look at the latest Fortran books

160 **Index to Advertisers** .....

THE COVER

Our cover shows Sesame Street's Big Bird riding a merry-go-round. There won't be any merry-go-rounds in the Sesame Place theme park but there will be a wide variety of other play activities, hands-on educational exhibits and computer games. See story on page 22.

June 1979
Volume 5, Number 6

Creative Computing magazine is published monthly by Creative Computing, P.O. Box789-M, Morristown, NJ 07960. (Editorial office: 51 Dumont Place, Morristown, NJ 07960 Phone: (201) 540-0445.)

Domestic Subscriptions: 12 issues, $15, 24 issues $28, 36 issues $40. Send subscription orders or change of address (P.O. Form 3575) to Creative computing, P.O. Box 789-M, Morristown, NJ 07960. Call 800-631-8112 toll-free (in New Jersey call 201-540-0445) to order a subscription (to be charged only to a bank card).

Second class postage paid at Morristown, New Jersey and at additional mailing offices.

Copyright© 1979 by Creative Computing. All rights reserved. Reproduction prohibited. Printed in USA.

Publisher	David H. Ahl
Editor	John Craig
Managing Editor	Burchenal Green
Associate Editor	Steve North
Contributing Editors	Frederick Chesson Margot Critchfield Thomas W. Dwyer Bill Etra Lee Felsenstein Robert Goff Stephen B. Gray Arthur I. Karshmer Theodor Nelson Trish Todd Alvin Toffler C. Barry Townsend Karl Zinn
Art Director	Nils Lommerin
Production Manager	Robert Borrell
Editorial Assistant	Cherie Lenzen
Typesetter	Janet Ganzenmuller
Advertising Sales	Marcia Wood
Marketing Coordinator	Nancy Wood
Software Development	Eric VanHorn Randy Heuer Ann Corrigan Jeffrey Yuan Rob Rich
Business Manager	Betsy Staples
Bookkeeper	Jeanne Tick
Retail Marketing	Jennifer Burr Ethel Fisher
Circulation Customer Service	Debbie Spence
Office Assistant	Barbara Shupe
Order Processing	Donna Costanzo
Book Service Supervisor	Holly Alderman
Book Service	Scott McLeod
Eastern Penna. Rep.	Paula Mann
California Rep.	F. Ray Moody

OK to Reprint

Material in *Creative Computing* **may be reprinted without permission** by school and college publications, personal computing club newsletters, company house organs, and non-profit publications. Only original material may be reprinted; that is, you may not reprint a reprint. Also, each reprint must carry the following notice on the first page of the reprint in 7-point or larger type (you may cut out and use this notice if you wish):

Copyright © 1979 by Creative Computing
51 Dumont Place, Morristown, NJ 07960
Sample issue $2.00;
One-year subscription $15.00

Please send us two copies of any publication that carries reprinted material. Send to attention: David Ahl.

Advertising Sales

Advertising Coordinator
Marcia Wood
Creative Computing
93 Washington Street
Morristown, N.J. 07960
(201) 540-9168

Western States, Texas
Jules E. Thompson, Inc.
1290 Howard Ave., Suite 303
Burlingame, CA 94010
(415) 348-8222

Southern California
Jules E. Thompson, Inc.
2560 Via Tejon
Palos Verdes Estates, CA 90247
(213) 378-6136

Mid-Atlantic, Northeast
CEL Associates, Inc.
36 Sohier Street
Cohasset, MA 02025
(617) 383-6136

New York Metropolitan Area
Nelson & Miller Associates, Inc.
342 Madison Ave., Room 830
New York, N.Y. 10017
(212) 661-9234

Southeast
Warren Langer Associates, Inc.
234 County Line Road
Gilbertsville, PA 19525
(215) 367-0820

Midwest
Didier and Broderick, Inc.
P.O. Box 337
Northfield, IL 60093
(312) 446-9571

4-Year Index

A four-year cumulative index to **Creative Computing** and **ROM** is available. Articles are cross-referenced to both individual issues and collected volumes (**The Best of Creative Computing, Vols. 1 and 2**). Articles are classified by subject area and listed by title and author. Over 2000 items are included. $1.00 postpaid in U.S., $2.00 foreign. Creative Computing, P.O. Box 789-M, Morristown, N.J. 07960.

Back Issues

Back issues of Creative Computing are usually in stock for the current and previous volume. Prices on 1977 (Vol. 3) issues are $2.00 each postpaid or three for $5.00. 1978 (Vol. 4) and 1979 (vol. 5) issues are $2.50 each postpaid, three for $7.00, or six for $12.00

Volumes 1 and 2 are available in book form, The Best of Creative Computing, Vols. 1 and 2. Each book is $10.00 postpaid. Creative Computing, P.O. Box 789-M, Morristown, N.J. 07960

Nine back issues of ROM are available in a complete set for $14.00 postpaid ($17.00 foreign) from Creative Computing.

Microform

Creative Computing is available on permanent record microfilm. For complete information contact University Microfilms International, Dept. F.A., 300 North Zeeb Road, Ann Arbor, MI 48106 or 18 Bedford Road, London WC1R 4EJ, England.

Foreign Customers

Foreign subscribers in countries listed below may elect to subscribe with our local agents using local currency. Of course, subscriptions may also be entered directly to Creative Computing (USA) in U.S. dollars. (bank draft or American Express card). All foreign subscriptions must be prepaid.

Many foreign agents stock Creative Computing magazines, books, and software. However, please inquire directly to the agent before placing an order. Again, all Creative Computing products may be ordered direct from the USA — be sure to allow for foreign shipping and handling.

CANADA	**Surface**	**Air**
1-year	$ 28	n/a
2-year	53	
3-year	77	

RS-232
Attn: Liz Janik
186 Queen St. W.
Toronto, Ontario M5V 1Z1, Canada

ENGLAND		
1-year	13	22
2-year	25	43
3-year	36	63

CREATIVE COMPUTING
Attn: Hazel Gordon
27 Andrew Close
Stoke Golding, Nuneaton CV13 6EL
England

FRANCE	F	F
1-year	105	180
2-year	200	345
3-year	290	510

SYBEX EUROPE
14/18 Rue Planchat
75020 Paris, France

SWEDEN	kr	kr
1-year	105	180
2-year	200	345
3-year	290	510

HOBBY DATA
Attn: Jan Nilsson
Fack
S-200 12 Malmo 2, Sweden

GERMANY	dm	dm
1-year	46	78
2-year	88	152
3-year	128	224

HOFACKER-VERLAG
Ing. W. Hofacker
8 Munchen 75
Postfach 437, West Germany

AUSTRALIA	$A	$A
1-year	23	47
2-year	44	92
3-year	64	136

ELECTRONIC CONCEPTS PTY. LTD.
Attn: Rudi Hoess
Ground Floor, 55 Clarence St.
Sydney, NSW 2000, Australia

JAPAN	Y	Y
1-year	4800	9400
2-year	9200	18,400
3-year	13,500	27,200

ASCII PUBLISHING
305 HI TORIO
5-6-4- Minami Aoyama, Minato-ku
Tokyo 107, Japan

PHILIPPINES	P	P
1-year	175	355
2-year	330	690
3-year	480	1,020

INTEGRATED COMPUTER SYSTEMS, INC.
Suite 118, Limketkai Bldg., Ortigas Ave.
Greenhills P.O. Box 483, San Juan
Metro Manila 3113, Philippines

KUWAIT	dinar	dinar
1-year	6.5	11.0
2-year	12.5	21.5
3-year	18.0	31.5

ASCON
Attn: Salah Zeineddin
P.O. Box 4052
Safat, Kuwait

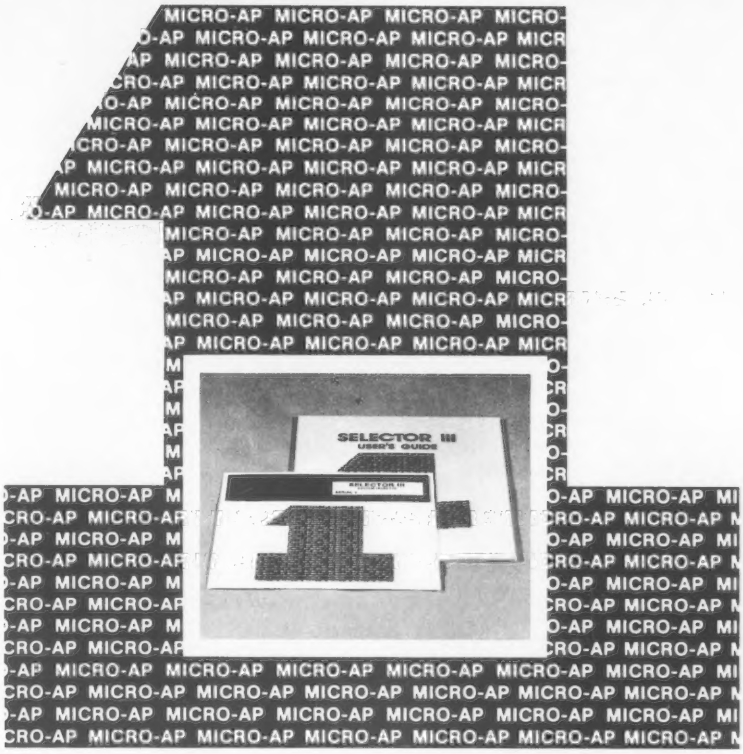
OTHER COUNTRIES		
1-year	$23	$39
2-year	44	76
3-year	64	112

CREATIVE COMPUTING
P.O. Box 789-M
Morristown, N.J. 07960, USA

ONE PACKAGE DOES IT ALL

Includes these Application Programs . . .

Sales Activity, Inventory, Payables, Receivables, Check/Expense Register, Library Functions, Mailing Labels, Appointments, Client/Patient Records



RANDOM, MULTI-KEY RECORD RETRIEVAL under CP/M, CDOS, IMDOS, ADOS . . .

SELECTOR III ALLOWS INSTANT RECALL OF ANY RECORD USING ANY INFORMATION ITEM IN THE RECORD. That statement deserves re-reading, because that ability makes SELECTOR III the most powerful Date Base Management System in microcomputers today!

With **SELECTOR III** you can...

- define a record format, assign retrieval keys, and begin entering data in minutes.
- create sorted pointers to records matching your specif or range of requirements.
- automatically generate reports with control-break summaries and unlimited variety.
- bring an application online in hours instead of months.

SELECTOR III comes complete with eight application programs that perform the tasks listed at top of page. And, since it's distributed in source code form, you can easily add subroutines to do specific computations or file updates.

SELECTOR III runs under CBASIC Vers. 1 or 2, and is priced at $295. SELECTOR III-C2 is dedicated to Vers. 2 only, runs about twice as fast, and costs $345.

Both systems are available in a variety of CP/M, diskette size and density formats including IBM 8"; North Star; Micropolis; TRS-80; Processor Tech Helios II; Altair; iCOM; Dynabyte; Imsai; and others.

Available from computer stores nationwide:

LIFEBOAT Associates
2248 Broadway, Suite 34,
New York, N.Y. 10024 • (212) 580-0082

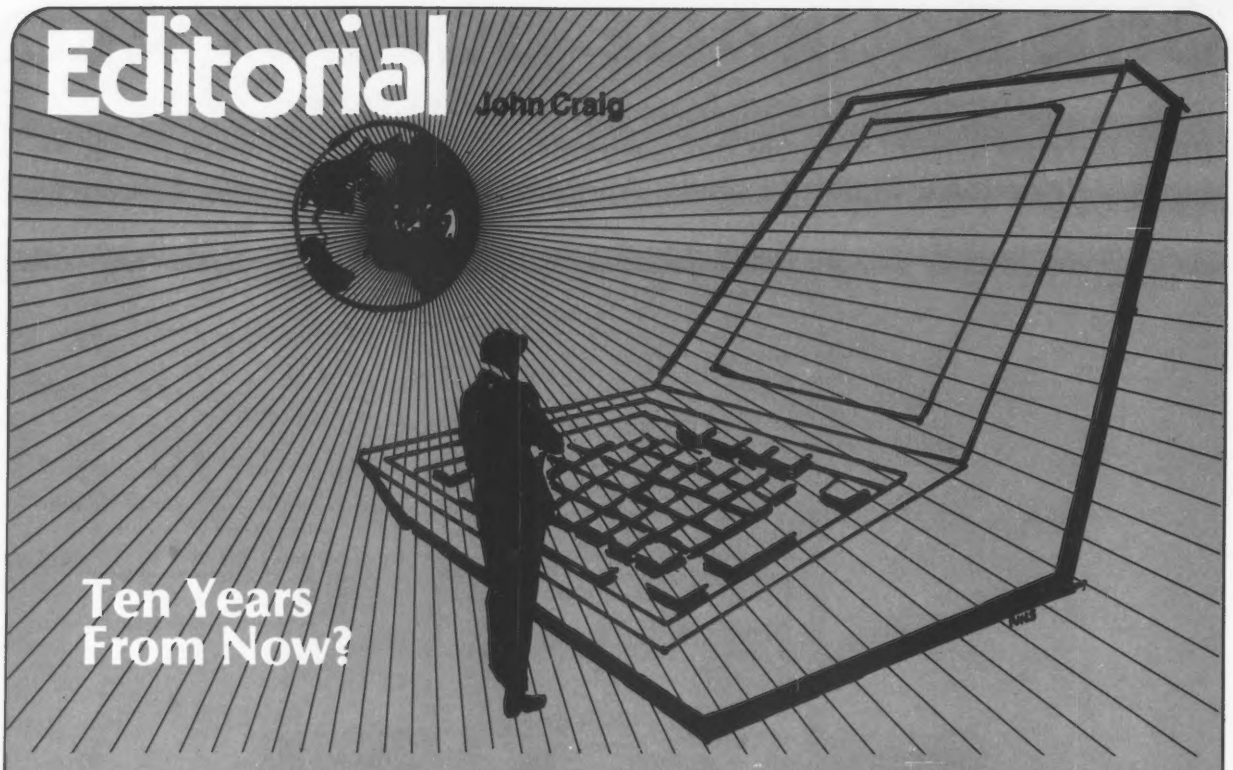
Or order direct from

MICRO-AP
9807 Davona Drive, San Ramon, CA 94583
(415) 828-6697

CIRCLE 144 ON READER SERVICE CARD

Editorial

John Craig



Ten Years From Now?

I'm currently serving on an advisory board at the University of Southern California for a research grant from the National Science Foundation into the "Technological Assessment of Personal Computers." At the most recent meeting of this board, we were subjected to a questionnaire regarding future trends in this industry. Everyone had a rough time with it. It asked questions about future prices of home and business systems, estimates of the number of systems that will be sold in the future (business, home and educational), the rise or decline in computer crime, new jobs (or displacement of workers), applications, and costs of software, just to mention a few.

The experiences of trying to cope with those questions, and the frustration I felt, started me thinking about the future of personal computing. To get a good feel for where we're going, it would seem that having some valid data on what the industry has done in the past would be valuable. That may or may not be true because from 1974 to 1978 we were strictly a hobbyist industry. From here on out the hobbyists will, in my opinion, be providing a good foundation for personal computing but the real market is the non-technical home and business user. I asked Jack Nilles, the project director for the research grant, if he had some figures on how many systems had been sold in the past. Generally, he said, most small companies would share that information but the larger ones only provided percentages (which sometimes added up to over 100%). The research team finally came up with a figure of 200,000 systems being sold in 1978 at a gross income of ½ billion dollars (approximately $2500 per system). I sure would like to see some figures for the beginning years ('74 to '78), because I'm somewhat of a history buff, but the future is what really counts.

It's projected that by the end of the 1980's, there will be approximately 87 million households in the United States (there are approximately 77 million now). I wasn't able to come up with what I consider valid figures on the number of small businesses, since there are so many variables, e.g., the number of employees, gross income and other factors. As of 1974 there were 13,902,000 proprietorships, partnerships and corporations in the U.S. That figure doesn't do much for me, since it includes General Motors right along with Ma & Pa's Corner Grocery. However, for the sake of getting a figure to work with, why don't we take ½ of those companies as potential buyers of micro business systems (7 million)? Actually, I would opt for a higher figure, but I'm trying to be conservative. There are 2.5 million primary and secondary classrooms in the U.S. today and it is projected the number will be about the same in 1989. So there you have it...our target market size: 87 million households, 7 million small businesses and 2.5 million classrooms. (Those figures were obtained from the 1978 edition of the "Statistical Abstract" and from estimates made by the USC research team.)

How much of that market are we going to reach in the next 10 years? Will it be one fifth of all those households? That would be 17.5 million homes with personal computers! And what if one third of those businesses (2.3 million) have microcomputer systems by 1989? I wouldn't try to guess what the educational community is going to do with this new technology, although I'd like to be optimistic. Traditionally, the educational market, because of its conservative nature, has been slow to utilize technological innovations. Furthermore, 70% of school budgets typically go toward salaries, which leaves 30% for teaching supplies. Computer systems will have to be obtained from that 30%. I would certainly think that new multi-tasking and multi-user systems will make micro systems

more attractive to schools in the future and small businesses as well.

What are the factors that are going to determine whether we make it or break it? There are four considerations; good applications software, marketing and advertising, cost, and user-oriented systems. They all go together, hand in hand. It's quite likely things won't ever get off the ground with home systems unless good, practical home applications software is developed. And when it is, it will be just as important that there be prime-time TV ads and other media exposure which convince and demonstrate to the American public just how useful a personal computer can be.. They aren't going to sell themselves . . . and word - of - mouth isn't going to do it. We've already seen examples of this from the TV ads by Radio Shack for the TRS-80. The entire industry benefits from these ads, indirectly, we'll see more and more of this when Texas Instruments, Hewlett Packard, Atari, Mattel and Sears enter the market. Two other considerations which will help are that many more people will have had computer exposure in the years to come through work and schools.

Cost and user-oriented systems are going to be key factors. This becomes even more important when you take a look at the socioeconomic breakdown of the U.S. population taken from a study conducted by Lloyd Warner for the Chicago Tribune. The upper class in this country (the socially prominent and very rich) make up 0.9% of the population. The upper-middle class (successful businessmen, professionals & top salesmen) account for 7.2% of the population. The lower-middle class (guess we lost the middle class somewhere) is made up of white-collar workers, such as technicians, teachers, office workers, small tradesman and most salesmen, and constitutes 28.4% of the population. The upper-lower class (factory production workers, skilled workers, service workers, etc.) account for the largest segment, 44%. The lower-lower class includes unskilled laborers, immigrants, magazine editors and people in nonrespectable occupations and makes up 19.5% of the population. Almost half of the population falls into that upperlower class segment and that's perhaps the most important reason why home computers are going to have to be easy to use and inexpensive. Anyone, and everyone, will be turned off if these things are too complicated. Since black & white television has made a 100% penetration into American homes, and color an 81% penetration, it's possible that cost won't be the major factor, assuming people will be able to buy a good system for close to the cost of a color TV. The important factor will be applications: people will have to have a good reason for buying a system.

The research being done at USC is an assessment of the impact personal computers will have on our lives. Let's hope there will be enough of them in the future to make a significant impact. My goal in life, and that of Creative Computing, is to show as many people as possible how they can use personal computers effectively, and in a way that will benefit themselves and society. I sincerely hope the most optimistic predictions turn out to be true. □

"A pencil, a card, and this low-cost reader... it's the new, fast way to enter data into your microcomputer."

Interfaces to TRS-80, Apple II, PET, and others.

Good news! Now, all you need is a standard #2 pencil, a card, and our new MR-500 mark sense card reader to quickly and easily enter data into your favorite microcomputer.

As Easy as One, Two, Three...

Here's all you have to do. *One* — program the card by marking with the pencil. *Two* — feed the card into the reader slot. *Three* — the reader automatically turns on, the card is fed through, and data is instantly entered into memory. It's the simple low-cost alternative to keyboard data entry.

Interfaces with TRS-80, Apple, PET...

The MR-500 is ready to plug into most popular microcomputers. Interfaces are already available for TRS-80, Apple II and PET. And we're developing others almost daily. So whatever your microcomputer, we'll make it easy to use our mark sense card reader.

For Educators, Small Businessmen, and...

The applications for our low-cost MR-500 are endless. For small businesses, it's ideal for inventory, time cards, labor distribution (just to name a few). Educators will find that the MR-500 streamlines test scoring, attendance records, and grade reporting. Bet you can find a use already.

The Small Reader for the Small Computer

The MR-500 is lightweight — 4 lbs. Compact — a 4½-inch cube. And at $750, it's the only mark sense card reader that makes sense for the small computer.

Phone or write for details. Or better yet, order yours today.

CHATSWORTH DATA CORPORATION
20710 Lassen Street • Chatsworth, California 91311
(213) 341-9200

CIRCLE 126 ON READER SERVICE CARD

We've worked like mad to

cook up all your favorites.

Now, we're cooking. Our boys in the lab have turned circuit chefs these past three months to create a *smorgasbord* of deliciously assembled boards to support your APPLE II,* TRS-80‡ or S-100 bus systems. Feast your eyes on our monstrous selection in the menu below. Then, order enough to satisfy your hunger for experimentation for months to come. Contact your local computer store, or call us direct. *Bon appetit!*

California Computer Systems
309 Laurelwood Road · Santa Clara, CA
(408) 988-1620 · 95050

So Nobody Goes Away Mad.

MENU

APPLE II Delicacies

7114 APPLE ROM $69.95
14K ROM . . . uses 7-2716 + 5V only . . . selectable ROM overlay . . . powers down . . . offers BLOCK and INDIVIDUAL ENABLE . . . permits DMA & INTERRUPT daisy chain operation.

7740 APPLE Programmable Timer Module $150.00
An MC6840 programmable computer timer for use in: frequency measurements . . . event counting . . . interval measuring . . . square wave generation . . . gated delay signalling . . . creating single pulses of controlled duration . . . pulse width modulation . . . and system interrupts.

7490 APPLE GPIB IEEE 488 Interface $250.00
Interface offering selectable unit addressing . . . supports bus as a talker, listener and controller . . . includes on-board ROM.

7710 APPLE Asynchronous Serial Interface $99.95
Interface featuring: on-board ROM . . . accurate baud rates . . . all common baud rates from 50 baud through 19200 baud . . . external baud available . . . conforms to EIA RS404 and a subset of RS232C.

7712 APPLE Synchronous Serial Interface $99.95
Interface featuring: on-board ROM . . . accurate baud rates . . . all common baud rates from 50 baud through 19200 baud . . . external baud available . . . conforms to EIA RS404 and a subset of RS232C.

7720 APPLE Parallel Interface $69.95
Interface with dual PIA . . . on-board ROM . . . power down ROM . . . supports INTERRUPT daisy chain.

7811 APPLE Arithmetic Processor . . $399.00
Processor with on-board, power-down ROM . . . 32-bit floating point arithmetic operation . . . based on AMD 9511 device.

7470 APPLE 3¼ Digit BCD Analog-to-Digital Converter $129.00
± 0 to 4.999 VDC range . . . floating or ground reference.

7520 APPLE Extender $25.00

7500 APPLE Wire Wrap Board $21.00

7590 APPLE Etch Board $21.00

7510 APPLE Solder Tail Board $21.00

16AM APPLE, TRS-80 16K Add-On Memory $120.00

S-100 Bus Fare

2016 MXVI 16K Static RAM Board . . . $299.00
For expansion even beyond 64K . . . uses popular 2114 static RAMs, addressable in 4K blocks.

2520 Extender Terminator $39.95
With all lines labelled . . . power lines fused for added safety . . . active & dynamic termination . . . designed to eliminate crosstalk.

2501 Mother Board Kit With Active Terminations & Sockets $119.95

4P10 Four Parallel I/O Board $99.95

2500 Wire Wrap Board $30.00
Accommodates up to 102 16-pin sockets, or 24 40-pin sockets.

2590 Etch Board $17.95
For etching your own S-100 circuit . . . ½-oz. copper PC board . . . hard-gold-plate fingers.

2510 Solder Tail Board $30.00
Accommodates up to 102 16-pin sockets, or 24 40-pin sockets.

2200 All-Metal Mainframe Box $399.00
12-slot card cage with power supply and fan . . . inputs are 105, 115 and 125V AC . . . outputs are +8V at 20 amps and ±16V at 4 amps.

*APPLE II is a registered trademark of APPLE Computers, Inc.
‡TRS-80 is a registered trademark of Radio Shack, a Tandy Co.

CIRCLE 124 ON READER SERVICE CARD

et cetera

et cetera

et cetera

Editing A Paper.

Editing a paper is a pleasaut business—if you like it.

If it contains much political matter people won't have it.

If the type is large it don't contain much reading matter.

If we have a few jokes folks say we are nothing but rattleheads.

If we omit jokes folks say we are nothing but fossils.

If we give a complimentary notice we are censured for being partial.

If we don't, all hands say we are a great hog.

If we insert an article which pleases the ladies, the men become jealous, and vice versa.

If we attend church they say it is for effect.

If we remain in our office, attending to our own business folks say we are too proud to mingle with other fellows.

If we go out they say we don't attend to our business.

If we don't pay up promptly they say we are not to be trusted.

If we pay up promptly they say we stole the money.

—The Calhoun Times, Aug., 1881

Career Opportunities

SOFTWARE SYSTEMS RADAR

Senior Engineers -

Design Digital Control Systems and Real Time Computer Systems.

Senior Engineers -

Design Command and Control Systems, Real Control and/or missile related programs.

Contact

Manager, Software Systems
Judge Electronics Services, Inc.
Suite 100
Two Newton Executive Park
Newton Lower Falls, MA 02162
617/965-9700

Professional Search Organization

LAWS OF COMPUTER PROGRAMMING

1. Any given program, when running, is obsolete.
2. Any given program costs more and takes longer.
3. If a program is useful, it will have to be changed.
4. If a program is useless, it will have to be documented.
5. Any given program will expand to fill all available memory.
6. The value of a program is proportional to the weight of its output.
7. Program complexity grows until it exceeds the capability of the programmer who must maintain it.

The Mathematician's Reply

When I asked him, what *is* the point in getting to the point
in straightening out the matter
in evening everything out
in thinking about it squarely
in keeping in line,
he answered me rather acutely,
"Don't be so obtuse. You're just missing the point because you're coming at it from the wrong angle.

Peter Payack

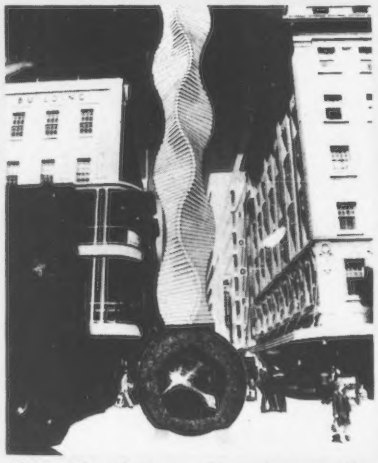
"...I just opened your bid and had a good cry..."

©Creative Computing

Chess Tournament

The second London microprocessor chess tournament will be held in the West Centre Hotel, Lilee Road, Fulham, London, England, from November 1st-3rd 1979. Any individual or company wishing further details should write to David Levy, c/o Personal Computer World, 62a Westbourne Grove, London, W2.

This year's event will be the first European Open Microprocessor championship. The highest placed participants will automatically qualify for places in the final of the first World Micro Championship which is scheduled to be held in 1980, also in London.



New Sculpture For Australia

A 30-m (98½-foot) kinetic sculpture involving laser beam images is to be built in Adelaide, capital of South Australia. To be known as the Adelaide Sonic Tower, it has been designed and will be built by a local artist of Polish origin, Mr Stanislaus Ostoja-Kotkowski. The tower has been commissioned by the City of Adelaide with the help of a $A50,000 gift from the Sidney Myer Charity Trust. The gift was made to mark the 50th anniversary of Myer S.A. Stores Limited, a branch of one of Australia's biggest retail enterprises. Mr Ostoja-Kotkowski said the final cost of the sculpture would probably exceed $A100,-000. It was the culmination of more than 20 years of experimentation with technology and electronics in art. The main sculpture would be a slowly spiralling composite of steel, glass and alloy castings. Work on the sculpture had already begun. The tower would contain a computer which would enable the sculpture to react, with sound and light patterns, to the environment.

"Micro-Computer Products to Look Up to"

NorthStar Gazer

Horizon Disk Capacity Keeps Growing

The Horizon is now capable of 720K bytes on-line! The Horizon can connect to four double density 5¼" single-sided disk drives. Each of those drives can access 180K bytes of information. A four drive system accesses 720K bytes!

That's capacity you don't usually find in a microcomputer, but there's even more to come! The North Star disk controller board is designed so that two-sided disk drives may be added as soon as they become available from North Star.

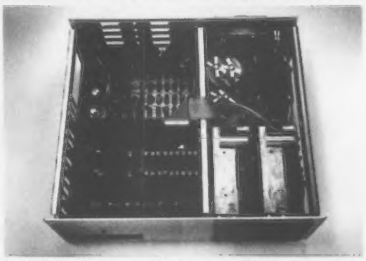
Existing Horizons will accommodate the new two-sided drives so North Star owners can simply add additional drives to up-grade their system. Each two-sided drive will access 360K bytes! That means the maximum on-line disk storage for the Horizon will increase to over 1.4 **million** bytes!

New Cabinet for Disk Drives

North Star additional disk drives are now available with the same high quality wood cover as the Horizon computer! The Additional Drive Cabinet (ADC) is designed to accept either one or two drives for the Horizon or for mounting North Star Micro Disk System drives. Like the Horizon, the ADC is available with either wood or blue metal cover. Included is a new power supply, capable of powering one or two drives. The ADC is $129 in kit form. Assembled, with one drive the ADC is $599, with two drives $999.

Pascal Now Available for Horizon

The much-heralded Pascal language is now being offered for use with the North Star Horizon computer. North Star, with the co-operation of the University of California at San Diego, is now delivering a Pascal Program Development system. North Star Pascal is ideally suited for developing large programs because of features such as: long variable names, block-structured control statements, and compilation. North Star Pascal is available on 5¼" diskettes for use with the Horizon or Micro Disk System. North Star Pascal will operate with either the Z80 or 8080 microprocessor.



Inside view of Horizon with processor board, RAM board, disk controller, two drives, and power supply.

Pascal, including documentation, is available in either single or double density versions for $49.

An auxiliary Pascal diskette, containing an 8080/Z80 assembler and some additional Pascal utilities, is available for $29. Complete information is available at your local retail computer store.

First Double Density, Now Double Memory

The new North Star 32K RAM board (RAM-32) has doubled the memory density of the popular Horizon computer. Available either with the Horizon or other S-100 bus computers, the RAM-32 runs at full speed—no wait states—with the 4 MHz Z80A microprocessor (as well as with slower Z80 and 8080 processors). Addressability of the RAM-32 is switch-selectable in four 8K regions.

North Star RAM features like bank-switching and parity checking are standard. The parity checking capability means that the RAM-32 is constantly diagnosing itself. That's a plus for your system. The fact that parity checking is a North Star RAM-32 standard is a plus for your pocketbook! There is no extra charge for this important capability.

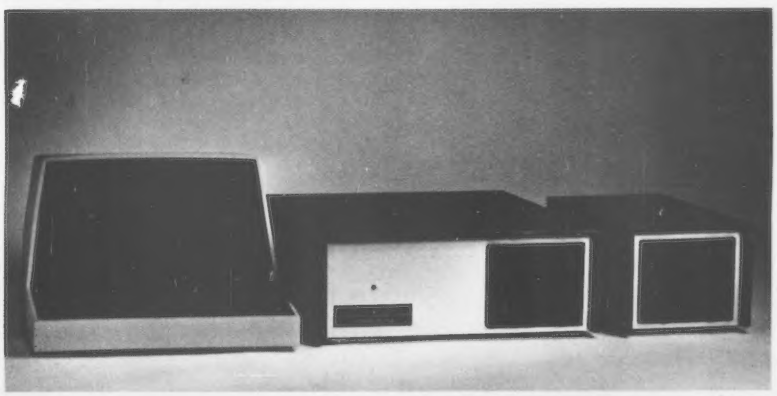
A Horizon with 48K of RAM can be configured by using one North Star 16K RAM board and a RAM-32. Need more memory? 56K can be configured by using two RAM-32 boards with one 8K region switched off.

NORTH STAR MDS, ZPB, FPB FOR OTHER S-100 COMPUTERS

Upgrade your system with these North Star products—available for any S-100 computer: Micro Disk System—a complete 5¼" floppy disk system, Z80 Processor Board, or the Hardware Floating Point Board.

Horizon and RAM board prices are:

	Kit	Assembled
Horizon - 1-16K	$1599	$1899
Horizon - 1-32K	1849	2099
Horizon - 2-32K	2249	2549
RAM-32	599	659
RAM-16	399	459



◀ A typical Horizon configuration: CRT, Horizon computer, Additional Drive Cabinet (ADC).

NorthStar Computers

2547 Ninth Street
Berkeley, California 94710
(415) 549-0858

CIRCLE 145 ON READER SERVICE CARD

Input/ Output

"Your Game Doesn't Work On My Computer"

Bob Leedom, the creator of Super Star Trek, and I recently received a letter from Dr. Albert Weinshelbaum complaining that Super Star Trek did not work on his computer, a Sorcerer; he also included a list of bugs and problems. Bob sent Dr. Weinshelbaum a thoughtful reply which states as well as I've ever seen the philosophy of publishing programs, games, books and magazines.

—DHA

Dear Mr. Weinshelbaum,

I'm sorry I couldn't have answered you sooner; your letter reached me just as I was leaving for a lengthy business trip. It's been two weeks since I received your list of bugs in the Super Star Trek program. I certainly hope that in that time, you've been able to find the cause or causes of your difficulties. The thing that bothers me is that yours is the first response I've had (in the four years since the program was first published) referring to any problem more serious than memory overflow or instruction translation. Those types of problems are handled straightforwardly: in the former case, (a) buy more memory or (b) pare down the program; in the latter, learn about the differences in your system (e.g. — method of handling strings) vs. the original system, and make appropriate alterations in the program.

I should mention that when Dave Ahl originally published my version of the program in his magazine, Creative Computing, the program had been written for a Data General NOVA minicomputer. Since then, he has had the program translated into Microsoft BASIC, and has republished Super Star Trek in the book of microcomputer games to which you refer.

Some thoughts on your problems with the program:

1. *I don't own a microcomputer, so I have no way of personally checking into the viability of this version of the program.*
2. *The half-dozen or so responses I've had to the publication of the microcomputer version have indicated nothing more serious than those difficulties I mentioned in the first paragraph. I believe most of those who contacted me were Radio Shack TRS-80 users, and at least one of those people has since solved all his problems. Nobody's yet mentioned out-and-out software bugs.*
3. *Have you had 100% success with other programs in the book? I keep thinking of a friend of mine who has an Ohio Scientific "Challenger" system (which also uses Microsoft BASIC), and there are some things that cause his computer to behave very strangely. This is not to condemn Microsoft in any way; on the contrary, their BASIC is generally recognized as a good implementation of the language.* The "funnies" usually come about due to some kind of interaction between the system software and the manufacturer's hardware. The point is that the Exidy Sorcerer is a relatively new machine, and I am therefore forced to wonder if all the bugs are out yet.*
4. *Lots of people have learned to avoid disappointment by assuming the following to be true (and by being pleasantly surprised when it's false): No puchased or published software will run unmodified on your machine, unless advertised as having been written specifically for your exact system configuration (same size memory, same peripherals).*
   This, of course, is analagous to the idea of being a pessimist all the time so as to never be completely disappointed.
5. *Concluding thought: I hope you'll take this in the proper spirit — the best solution to your problems is to dig in and troubleshoot them yourself. (That's exactly what I did; the first version of Super Star Trek I started with was written for an entirely different computer system, and I had to rewrite a large percentage of the program to get it to run for me.) You'll learn a lot about programming techniques and you'll be able to tailor the program to your own likes and dislikes about the game. I now find that getting a program to run, and watching someone else use and enjoy it, is actually more fun than playing the game myself.*

I hope you won't give up, but will work on getting the program to run, and then start adding your own features! Good luck!

Robert C. Leedom
14069 Stevens Valley Ct.
Glenwood, Maryland 21738

PET Disks From CGRS

Dear Editor:

I want to thank you for the fine write up we received on our disk system for the PET (December issue 1978).

I was somewhat disappointed to read the column by Yob (March 1979) on "Personal Electronic Transaction." In that he gives the names and addresses of companies selling the disk for the PET. But all he states about us is that there are other companies on the east coast. Is Yob somewhat prejudiced about east coast companies that he doesn't want to give our name and address?

Fortunately, we have an ad in this issue but I don't believe Mr. Yob did his homework.

We also have a large drive (8") for the PET or two drives which will put ½ million bytes of storage on the PET.

Joseph T. Swope, President
CGRS Microtech
P.O. Box 368
Southampton, PA 18966

We're not just blowing smoke

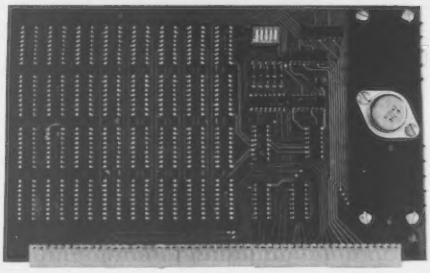
SMOKE SIGNAL BROADCASTING PRESENTS IT'S

$299.00

M-16A STATIC MEMORY SYSTEM

- Allows SWTPC 6800 expansion to 48K
- Low Power • Uses Single +8 Volt Supply
- SWTPC 6800 Plug Compatible • STATIC – No refresh required

The M-16A STATIC random access memory system, with a total storage capacity of 16834 words of 8 bits each, is switch selectable to any 4K starting address, and a hardware write protect switch is also included. The system's storage elements are 4K by 1 STATIC memory chips which store 4 times as much in only 12% more space than the low power 2102's. Typical access time is fast enough to work a 6800 based computer operating at 2 MHz and all systems are factory tested at 2 MHz.



The M-16A STATIC random access memory system, with a total storage capacity of 16834 words of 8 bits each, is switch selectable to any 4K starting address, and a hardware write protect switch is also included. The system's storage elements are 4K by 1 STATIC memory chips which store 4 times as much in only 12% more space than the low power 2102's. Typical access time is fast enough to work a 6800 based computer operating at 2 MHz and all systems are factory tested at 2 MHz.

The M-16A STATIC random access memory system, with a total storage capacity of 16834 words of 8 bits each, is switch selectable to any 4K starting address, and a hardware write protect switch is also included. The system's storage elements are 4K by 1 STATIC memory chips which store 4 times as much in only 12% more space than the low power 2102's. Typical access time is fast enough to work a 6800 based computer operating at 2 MHz and all systems are factory tested at 2 MHz.

SMOKE SIGNAL BROADCASTING®

31336 Via Colinas, Westlake Village, CA 91361 (213) 889-9340

CIRCLE 182 ON READER SERVICE CARD

SMOKE SIGNAL BROADCASTING®

31336 Via Colinas, Westlake Village, CA 91361
(213)889-9340

☐ Send information on your M-16A
☐ Send name of nearest dealer

Name _____
Address _____
Company _____
City _____
State/Zip _____

put...input/output...in

Go, with Proverbs

Dear Editor:

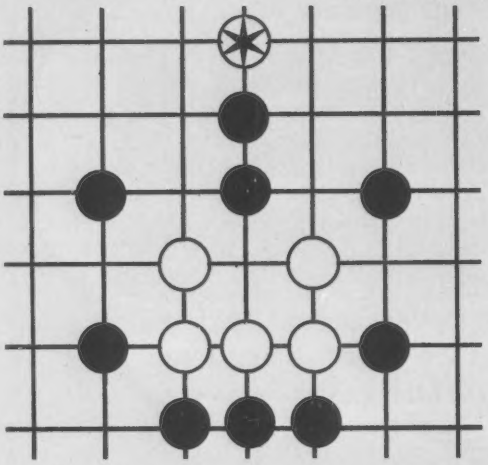
I enjoyed the article on Go, but I felt that a bit more stress should have been put on the use of the proverbs as a possible source for algorithms.

Go proverbs are general hints for play (you listed Segoe's "Go Proverbs Illustrated" in the references, which is excellent). They don't always work, but guide the play and reduce the search that the play must do for a good play among the possibilities he is facing.

I have enclosed a classic example (which even has the name "Jutaro's Escape," it is so well known. It illustrates the proverb that in a symetrical formation, the best bet is on the center. White is to move and his stones that are almost enclosed are to live. His only play is at the starred white stone; any other play will not work. It takes 11 moves for this simple problem to work itself out.

Trying to program all possible moves even in this simple formation would be a bear, so the proverb quickly gives us a heavy weight to the centered plays and we would only look at them. Could be a good approach.

Joe Celko
Box 11023
Atlanta, GA 30310



TRS-80 Frustration Again

Dear Editor:

I read Ron Salveson's letter in your March issue, and found his comments all too true. I sent him the following letter.

I too had a hard time finding help and practical uses for my Radio Shack computer. I think the problem may be that Radio Shack puts out a fine product, but that they just aren't equipped to satisfy the demand for software and support their machine requires. I understand that Commodore has the same problem with the PET. So TRS-80 owners aren't alone with their frustration.

Fortunately, independent suppliers have been able to provide some hardware and software to fill the gap. For the time being we will just have to be resourceful and make the most of our experimentation and 'alien' peripherals.

Dear Ron,

I think that the people that are getting the real use out of their products aren't waiting for Radio Shack to start servicing the TRS-80 owners. They're buying magazines and books and xeroxing articles full of information.

You mentioned the lack of a way to get your TRS-80 to send morse code. Microtronics, Inc. a small company in Hughson, Calif. puts out what they call the 'M-80' Ham Interface, for about $100 in kit form. This plugs into the back of the TRS-80 and not only sends what you type on the keyboard, but also sends either random 5 letter code groups, or even random 5 letter words if you want. It will also copy the morse code anywhere between 3 and (they say) 300 words a minute. I bought one of the early models of this, Ron. After a few little bugs in the hardware and a new software tape - it worked just fine. It also sends and receives RTTY messages.

Two weeks ago microtronics sent me an updated instruction manual. Included, almost as an afterthought, was a short program in basic that let's you use a regular RTTY terminal as a line printer. I could hardly wait to get things hooked up: when I did, I found the system worked perfectly!

As far as joining a club goes, I was sorry to hear that you were given the cold shoulder by your local computer club. Unfortunately, a lot of 'pure' computer buffs consider the TRS-80 something for the masses. They don't realize it is possible to create useful programs without their machine language and assembly program expertise.

If you don't mind spending the money, there are a lot of good basic programming books around. The Radio Shack Level-II manual can be pretty scary unless you have a good grasp of Level-I under your belt. You might try taking apart some of the programs listed in the computer magazines. See how they accomplish some of the things you might want to do. There's nothing wrong with borrowing part of someone else's program, as long as you don't go into business with it.

Most importantly, don't get discouraged. I know how you feel after having put out almost $1000 and wondering how you will recover your money's worth. That can be a pretty sinking feeling. You'll have to spend some more money to get the computer to really be 'useful' for other things besides games. I think the microtronics package is the best bet. If you already have an RTTY printer, so much the better. You can also use the printer to list your programs. It leaves out the equals sign, and rings a bell instead - but so what - you've saved $1,500...

About getting programming help — it's unfortunate, but a lot of the Radio Shack stores have managers that are scared to death of the TRS-80. They keep it turned off in the back of the store while they keep giving away free batteries and selling eight-track stereo systems - the things they understand. If you bought your computer from a store like this, never go back. Find a store that has the computer in front, running, and loaded with exciting programs for you to try. The salespeople at a store like this will be your best source of information about your computer. Befriend these people, and visit them often. I've never found them too busy to answer questions, even to holding on the phone while I tried debugging a program with their suggestions.

I hope I've given you a little encouragement, Ron. Keep at it, and let me know how it goes. I'd like to think you are as happy with your TRS-80 as I am with mine...

Mike Callaghan
122 Arlington Dr.
Pasadena, CA 91105

"If the contemporary individual is going to have to cope with the equivalent of millennia or change within the compressed span of a single lifetime, he must carry within his skull reasonably accurate (even if gross) images of the future."

Alvin Toffler

What every educator should know about desk-top computers.

It's easy to get into classroom computing. What's tough is to do it right. With so much talk about computers in the classroom, educators like yourself want all the facts before they recommend any system for classroom use. That's why Apple Computer's new "Curriculum Materials Kit" can help, with answers to your questions and some very important data you may not have considered before.

Who uses desk-top computers.

Hundreds of innovative educators have already discovered the Apple Computer for instructional applications from kindergarten through college. Apple gives you computer-assisted instruction capabilities, including drill and practice, tutorial, problem-solving, games, simulations, and more.

Apple engages student interest with sound and color video. In fact, your students will be able to write programs and create high-resolution graphics. And you can use your Apple for testing, counseling, even classroom data processing. That's just the beginning.

What to look for.

Once you've unlocked the power of the desk-top computer, you'll be using Apple in ways you never dreamed of. That's when the capabilities of the computer you recommend will really count. You don't want to be limited by the availability of pre-programmed cartridges. You'll want a computer, like Apple, that you can also program yourself. You don't want to settle for a black and white display that limits you to just putting words and numbers onto the screen. You'll want a computer, like Apple, that can turn any color tv into a dazzling array of color graphics.* The more you and your students learn about computers, the more your imagination will demand. So you'll want a computer that can grow with you as your skills and experience grow. Apple's the one.

How to learn more.

The quickest way to learn more about desk-top computers is to request your free copy of Apple's Curriculum Materials Kit (specify level). Get yours by calling 800/538-9696; in California, 408/996-1010. Or by writing us. Then visit your local Apple dealer. We'll give you his name and address when you call.

*Apple II plugs into any standard TV using an inexpensive modulator (not included).

apple computer
10260 Bandley Dr., Cupertino, CA 95014

CIRCLE 119 ON READER SERVICE CARD

CAST A SPELL. WIN A SORCERER.

If you've written software in Altair Basic, you've written "spells" for the Exidy Sorcerer.

Now, make it pay off!

There's never enough software. Particularly good software.

That's why Exidy is sponsoring a software contest where nobody loses.

Altair programs run on Sorcerer. The Sorcerer computer's Standard Basic is compatible with Altair 4K and 8K Basic. So our contest is open to programs—we like to think of them as "spells" or "Sorcery"—written in all three of those Basic versions.

WIN THIS EXIDY SORCERER.

Trade one of yours for one of ours. Just for entering a program in our contest, we'll send you a new, professionally written and documented program. Free. It's a classic game of concentration that's a fun mind-stretcher for both kids and adults. Plus you'll get our new 20" by 24" color poster.

And maybe 99 more good programs. We'll publish a bound book of the best programs entered—up to 100 of them, with full credit to each author. If you enter you can have a copy for just the printing and mailing cost. And if your program is included, you get the book free.

And maybe a free Exidy Sorcerer: Submit one of the four programs judged "best," and win a free Sorcerer computer. (Or choose Sorcerer accessories of equal value.) There'll be one winner in each of the following categories: Business, Education, Fun & Games, and Home/Personal management.

Test-run your entry free. Take your program to any participating Sorcerer dealer if you want to give it a test run. At the same time, maybe you'll want to jazz up your program to take advantage of Sorcerer's state-of-the-art features. These include 512 by 240 high-resolution graphics; user-defined characters; and dual cassette I/O, among others.

You can turn in your entry right at the dealer's. And collect your poster and new program on the spot.

Enter now. Send us your entry with the coupon. Or visit your dealer. But cast your best spell at Exidy now. And see if you can't make a free computer appear on your doorstep.

RULES:

1) Entries, including documentation, must be printed by computer or typed double spaced on 8½ by 11 paper, with your name on every page.
2) Enter as many times as you like. This coupon, or a copy of it, must be completed and attached to all entries.
3) Enter at any participating Exidy Sorcerer dealer, or mail entries postpaid to the address on this coupon.
4) Entries must be received by midnight, Aug. 31, 1979. Winners will be notified by Nov. 30, 1979. For a list of winners, send a self-addressed, stamped envelope marked "Winners List" to the coupon address.
5) You warrant, by your signature on this coupon, that all program and documentation material included in your entry is entirely your own original creation, and that no rights to it have been given or sold to any other party, and you agree to allow Exidy to use, publish, distribute, modify, and edit it as it sees fit.
6) All entries become the property of Exidy, Inc. No entries will be returned, nor any questions answered regarding individual entries. No royalties, payments or consideration beyond the items set forth in this advertisement will be given to any entrant.
7) Judging will be by a panel of experts chosen by, and including representatives of, Exidy, Inc. Judges may assign programs to whichever entry category they consider appropriate. Decision of the Judges is final.
8) Employees of Exidy, Inc., its dealers, distributors, advertising agencies and media not eligible. Void where prohibited, taxed or restricted by law.

CIRCLE 150 ON READER SERVICE CARD

Exidy inc.

EXIDY, INC.
969 W. Maude Ave.
Sunnyvale, CA 94086

Gentlemen:
Here's my "spell." Send me my free program and poster. If I win, send my Exidy Sorcerer computer to:

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

DAYTIME PHONE _____

TITLE OF PROGRAM _____

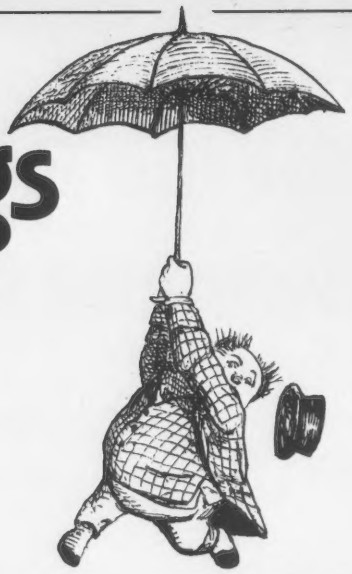
CATEGORY ☐ Business ☐ Fun & Games
☐ Education ☐ Home/Personal Management

SIGNATURE _____ DATE _____

Copyright 1979, Exidy, Inc.

Random Ramblings

With John Craig



Droppin' in on Vector Graphic

I recently stopped in for a short visit with the folks at Vector Graphic, just North of Los Angeles (31364 Via Colinas, Westlake Village, CA 91361). The last time I visited them was in early 1977, shortly after they had gone into business. Their growth has been incredible! I suspect that it might be due to the fact they put out some high-quality hardware and software... and service. I was allowed into their development department, with my camera, and there were a few things there that I thought you'd like to hear about.

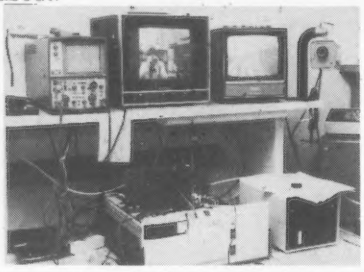


Photo 1: View of the development lab showing monitor.

Photo 1 was obviously taken in a development lab! The wire-wrapped board on an extender is a new digitizer board they have under development. The board will be working in conjunction with their high-resolution graphics board for image processing applications. If you haven't seen the results from their high-resolution board then perhaps you'll be impressed with the picture on the left monitor...which is a digitized picture of me taking the photo. The monitor on the right is a normal TV picture. I wish it had turned out a little better to show clearly the minor differences between the two images.

Another item I was shown, but not allowed to photograph, was a low-cost printer they have under development. It's a 72-column, dot-matrix printer which uses the Itoh print mechanism and has upper and lower case characters (without descenders, however). They're going to be shooting for a price around $850.

I was also given a demonstration of Vector's Memorite Word Processing System (Photo 2). It's a shame we didn't have a review of this system in last month's issue, which was devoted to word processing. Hopefully, we can find someone in the near future to do an objective review for Creative. I was very impressed with the capabilities of the system and how easy it was to use. Figure 1 is a sample of some of the fancy footwork it can do. They currently have French and German versions of Memorite and are working on more.

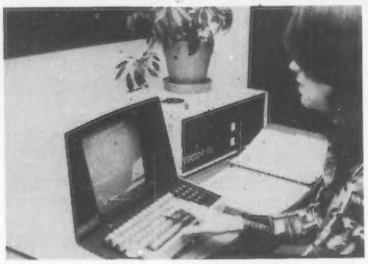


Photo 2: Vector's memorite Word Processing System.

At the same time I was there Vector was being visited by a delegation from China. The Vector Graphic system had been highly recommended and their preliminary visit was to check into the purchase of 500 units. (I heard somewhere that if the sale went through, those 500 units would increase the number of computers in China by 50%!) There are some people who might get upset at the thought of exporting such technology but those systems are a far cry from monsterous mainframes capable of military applications (although we'll probably see those exported in the near future, also). As a matter of fact, personal computer systems could very well help in establishing personal relations...and

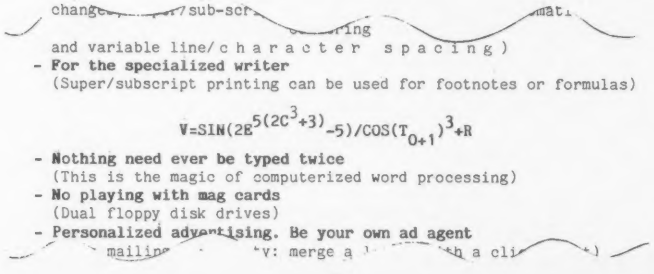

and variable line/character spacing)
- For the specialized writer
(Super/subscript printing can be used for footnotes or formulas)
$V=SIN(2E^{5(2C^3+3)}-5)/COS(T_{O+1})^3+R$
- Nothing need ever be typed twice
(This is the magic of computerized word processing)
- No playing with mag cards
(Dual floppy disk drives)
- Personalized advertising. Be your own ad agent

Figure 1

those kind of relationships help in getting to know one another better.

New Publications and Miscellaneous

6800 owners will be happy to know there is now a magazine devoted strictly to 6800 hardware and software. It's called '68' Micro Journal and is published and edited by Don Williams and Mickey Ferguson (3018 Hamill Rd., P.O. Box 849, Hixson, TN 37343). Don has complained to me for years that the 6800 users should have their own publication...so he started one. Subscriptions are $10.50 per year.

The folks at Aresco (P.O. Box 43, Audubon, PA 19407), Terry Laudereau and Rick Simpson, are going into their 2nd year of publishing The Paper, a newsletter for PET owners. They've also started newsletters for Sorcerer, Apple, TRS-80 and VIP owners. Drop 'em a line...they put out some good material!

One of the greatest shortcomings in this industry is the fact there are hundreds of brilliant people who can sit down and design a piece of hardware or write a good applications program and then fall flat on their face when it comes time to market it! If you're among this select group, and don't be afraid to admit it if you are, then let me suggest you send a dollar bill to CyberGrafix Advertising Design, 20201 Stagg St., Canoga Park, CA 91306. Sheila Clarke, the director of CyberGrafix, was formerly editor of SCCS Interface Magazine and knows the ins and outs of marketing and advertising in this field as few people do. She's put together a little book called "Advertising ARTiFACTS" which she'll send you upon receipt of that dollar. It's a little self-serving in that she points out the reasons why you might want to go with an ad agency. However, I guarantee you'll get more than your dollars worth out of it, especially if you have questions on what advertising costs and what kind of results to expect.

Have you got something to sell? Or, is there a certain piece of hardware or software that you've been looking to buy? ON-LINE is the "buy & sell forum for computer hobbyists" and is published every 3 weeks (like clockwork) by Dave Beetle...and it's good. (Of course it's good...or I wouldn't be telling you about it!) Dave is another one of those people who likes dollars. If you send him one, he'll send you 4 issues of ON-LINE (24695 Santa Cruz Hwy., Los Gatos, CA 95030).

I've seen advertisements for a product called "Floppy-Armour" and just recently I stumbled across one...and thought I should share it with you. It's a lightweight, styrofoam mailer for shipping mini-diskettes (I don't believe they have one for 8" diskettes). The strength and rigidness of the thing is absolutely incredible. It was designed for software distributors and you're going to be a happy customer if the next diskette you order comes shipped in one...because the US Postal "Service" will have a heck of a time trying to mangle it. They're available from Square 1, 614 18th Ave., Menlo Park, CA 94025.

The Dropouts

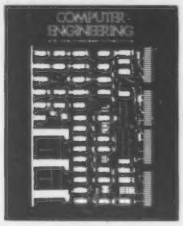
ON-LINE has recently been a good source for finding a used PET, TRS-80, and other computers. This disturbs me. I'm sure there are some people who bail out of this hobby because of financial considerations ...but what about the others? Why are people dropping out? That's a question that should be of concern to all of us. Is it because things aren't as easy as they should be? Is the software not user-oriented enough? Are hardware failures leading to large doses of frustration and anxiety? Is the service and support being offered by computer stores and other retailers not up to par? Is it because some users haven't found enough practical home applications software to warrant such an expensive "toy"? Or, is it because the computer has come between a man and woman because one or the other is spending all their time with the machine instead of their mate?

Personal computing is on the threshold of making the big jump forward or become mired in a quicksand of its own making. Last year saw the beginning of the emergence of the consumer market. I think it's important that we find out if the majority of these dropouts are among the new, non-technical, users of personal computers. If they are, then perhaps there are some things we should take a close, hard look at and make some changes. I'll be putting some effort into reasearching these questions in the future and get back to you with the results. (I don't know what the heck we're going to do if broken homes are the biggest reason people are dropping out!)

Data Files For Sale

I get a fair share of phone calls and letters from people asking me if I know of, and can recommend, a particular piece of software for a par-

FOR THE SERIOUS STUDENT OF HARDWARE SYSTEMS DESIGN



"This is an excellent book...a major contribution to the literature of computer hardware."
—Gerrit A. Blaauw
Technical University of Twente
Enchede, Netherlands

"...a valuable historical record and a fascinating reference work for engineers and computer scientists to gain insight into the issues and traps of developing and marketing complex products in a fast changing field."
—Jack B. Dennis
Massachusetts Institute of Technology

Computer Engineering: A DEC View of Hardware Systems Design by C. Gordon Bell, J. Craig Mudge, and John E. McNamara is the story of hardware systems design practiced at Digital Equipment Corporation over the past 20 years.

Computer Engineering is written for people who want to or must understand the evolution of hardware systems design. The focus of the engineer and student of design will be primarily on the highly technical discussions, while that of the manager/planner will be more on the economic and marketplace issues.

The three introductory chapters discuss computer systems from seven different perspectives; technology evolution; packaging and manufacturing. Five major sections follow: "In the Beginning" (transistor circuitry and DEC modules), "The Beginning of the Minicomputer" (18-bit computers, 12-bit computers, and structural levels of the PDP-8), "The PDP-11 Family" (from the beginning of the Family through VAX), "The Evolution of Computer Building Blocks" (RTMs, LSI processor bit slices, and multi-microprocessors), and "The PDP-10 Family." Three appendices cover the ISPS and PMS notations, and measuring computer performance. A bibliography and index are included.

585 pages, 83 tables, 364 figures, hardcover, $19.95, plus $2 for postage and handling (U.S. only).

Send check or money order to: Dept.C10, Educational Services, Digital Equipment Corporation, Crosby Drive, Bedford, MA 01730.

digital

I would like to order_____ copy(ies) of *Computer Engineering: A DEC View of Hardware Systems Design.*
Enclosed is a check or money order for $_____.
Please ship book(s) to:
Name_____
Company/University_____
Department_____
Street_____
City_____ State_____ Zip_____
C10

Random, con't....

ticular machine. I'd like very much to have that data on my system so that I could call it up when needed. I suspect that someone out there has developed a file of all that data for one of the popular data base systems. Why not sell it? Let's face it, there's a lot of time and effort involved in entering information into a data base. I'm sure there are other examples of data files (for both home and business) which would be saleable but this particular one should be of interest to all computer stores, consultants, manufacturers and others in the industry.

It would be important that the data file be developed for a data base system which is in widespread use, since the only thing you'd be able to sell is the file unless you were also licensed to sell the data base program. Another idea would be to get in touch with the people selling those programs and ask if they'd also like to sell your data file for a royalty. That would make their program more desirable and help sales. (But, whatever happens, don't forget I'm looking for that software file!)

Computer-Aided Instruction

Many years before personal computers came along it had been established that computer-aided instruction (CAI) was a viable method for teaching, or supplementing, certain courses. It has chalked up some very impressive performance records in colleges, secondary and primary schools across the country. The reason for the success of those programs (usually developed on larger systems) is because they were developed by experts, people with extensive background and degrees in the educational field. There are many important considerations which go into the design of a meaningful CAI package; psychological factors, proper scoring, being able to interpret feedback and, most importantly, being experienced in the preparation of questions and response choices which aren't ambiguous.

CAI programs are sadly lacking at this point in time, but then so are a lot of other programs. However, the really sad thing is that the few CAI programs which has surfaced are not very good. Just because a person knows a particular subject inside and out does not mean he or she can sit down and write a programmed-instruction course on it. I just hope we're not seeing the beginning of a trend where anybody and everybody thinks they can sit down and write these programs.

In the years to come CAI should become a widespread application in schools, homes and businesses. I think we'll see a lot of home correspondence courses and there are a multitude of situations where CAI can supplement on-the-job training at work.

At the very minimum I hope programmers planning to develop CAI packages will at least spend time at the local library reading some of the many books on the subject. There are a lot of important techniques to be learned from those books. In addition, it wouldn't hurt to take some courses in the subject area at a local college or university. □

New North Star Software

• DOS+ $35
Enables any program to execute all North Star Disk and/or Meca Tape commands. Allows batch command list and more.

• PRO-TYPE WORD PROCESSOR $75
Easy to learn. Combines text input, editing and printing in one program. Features right margin justification, tabs, paging, underlining, relocation of text blocks, etc. Requires only 8K of memory. Manual alone, $25.

• GUIDE TO BASEX $33
A new interactive compiler similar to BASIC for 8080-type microcomputers (Z-80, 8085). Executes programs up to 10 times faster than equivalent programs while requiring about half the memory space. Features include: array variables; string manipulation; arithmetic operations on signed 16 bit intergers; and versatile I/O communication functions. Manual alone $8.

• BASEX TAPE and DISK GUIDE $35
Allows your BASEX programs to access up to four North Star Disk and/or Meca Tape drives. All operations can be executed from the keyboard. Manual alone $20.00.

Specify:
North Star Disk/Meca Tape/Other
Send for Free Literature
INTERACTIVE MICROWARE INC.
P.O. Box 771
State College, PA 16801
(814) 238-8294

CIRCLE 155 ON READER SERVICE CARD

THE TRS-80 ASSEMBLY LANGUAGE DEVELOPMENT SYSTEM.

(A STEAL AT TWICE THE PRICE)

A short time ago, Microsoft introduced TRS-80 FORTRAN— a complete ANSI-standard FORTRAN with macro assembler, linking loader, and text editor, all for only $350. **The response has been overwhelming.**

Many TRS-80 users even told us, "The assembly language development software alone is worth that price." We think they're right, of course, but we've made it an even better deal.

ANNOUNCING: THE TRS-80 ASSEMBLY LANGUAGE DEVELOPMENT SYSTEM FOR $175.

For half the price of the TRS-80 FORTRAN Package, you can buy the TRS-80 ASSEMBLY LANGUAGE DEVELOPMENT SYSTEM, including:

EDIT-80 A fast, random access text editor that's easy to use and loaded with features. Lets you insert, replace, print or delete lines; edit individual lines; renumber lines in a file; and find or substitute text.

MACRO-80 The best Z80 assembler anywhere. MACRO-80 supports a complete Intel-standard macro facility plus many other "big computer" assembler features: comment blocks, octal or hex listings, 8080 mode, titles and subtitles, variable input radix (base 2 to base 16), and a complete set of listing controls.

LINK-80 Loads your relocatable assembly language modules for execution and automatically resolves external references between modules.

CREF-80 Gives you a complete dictionary of program symbols, showing where each is defined and referenced.

The Microsoft TRS-80 FORTRAN Package is still available for $350. Or, for HALF PRICE, get the TRS-80 ASSEMBLY LANGUAGE DEVELOPMENT SYSTEM.

Either way, it's a steal.

TO: Microsoft, 10800 N.E. 8th, Suite 819, Bellevue, WA 98004

☐ Send me the works! TRS-80 FORTRAN Package for $350.

☐ Send me half the works! TRS-80 Assembly Language Development System for $175. CC6

☐ Check enclosed ☐ Master Charge ☐ VISA

CARD NUMBER EXP. DATE

CARDHOLDER'S SIGNATURE

NAME

ADDRESS

CITY STATE ZIP

MICROSOFT

Dealer Inquiries Invited

Sesame Place is a 3-dimensional attraction that blends entertainment and educational experience as the Sesame Street TV show, but for the entire family.

BUSCH GARDENS® **SESAME PLACE** CTW CHILDREN'S TELEVISION WORKSHOP

Ground level view of the Sesame Place model. The 5,000 sq. ft. Computer Game Center is in the building to the far right. The enclosed space also includes a sound and light area, restaurant and retail store.

Background of CTW

The Children's Television Workshop began with "Sesame Street," and has become an international institution. It is led today by Joan Ganz Cooney who a decade ago wrote the proposal that started the educational series.

Building on Sesame Street now approaching its tenth broadcast season, CTW has become a diversified educational enterprise which serves adult audiences as well as children. Sesame Street last year reached 8 million households with children under six. Millions of other households with older children — and thousands with no children at all — also tuned in, demonstrating the universal appeal of the puppets, human hosts and first rate animation that make up the show.

Another CTW show, The Electric Company, a series to teach reading skills to elementary age children, reached an estimated five million homes last year with children in the target age range of six to eleven. Members of the show's repertory company have become instantly recognizable to grade school youngsters. It is the most widely used television series in classrooms in the United States.

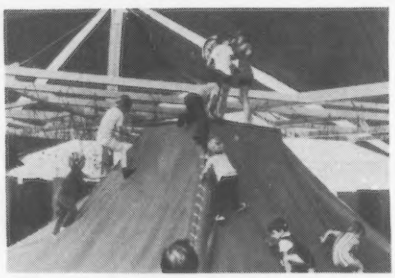
Research Is Vital

The Workshop was originally organized as a nonprofit experimental center. A major reason for its success is practical research. Sesame Street and The Electric Company, for example, continue to be the most thoroughly researched programs in television history.

During the development and production of a new Workshop project researchers work with line staff and with outside experts to determine elements that will combine appeal and educational impact.

Three seasons ago, CTW's research and outreach staff teamed up with producers in the adult TV series on health called "Feeling Good." Building on this experience, CTW is now producing a series of short spots called Health Minutes for distribution throughout Latin America sponsored by Xerox Corporation.

For CBS and Kraft Foods CTW developed its first major commercial TV series for primetime viewing, based on the C.S. Lewis classic, "The Chronicles of Narnia." A two-hour animated special, adapted from the first of the seven books in the series, "The Lion, The Witch and The Wardrobe," was broadcast in the Spring of 1979. And the Workshop is now developing a new daily educational series to help introduce the subject of science and technology to children 8 to 12.



"King of the Mountain" has a foam rubber base and a four-foot square summit. It offers action, challenge and even a sense of accomplishment.

Finally, special CTW teaching materials in the form of books, games, posters, and filmstrips are used in grade schools and day care centers. Sesame Street Magazine has nearly 750,000 circulation and the Electric Company Magazine with 250,000 circulation is doing well also.

The "Sesame Place" Project

For more than a year, a task force formed by CTW — composed of creative, research and financial experts — has been studying today's leisure time market. The group has been searching for the basis of a 3-dimensional attraction that blends entertainment and purposeful educational experience as adroitly as the television series do and for the whole family.

The task force has studied all the big, major theme parks whose staged shows and thrill rides appeal to older children and adults; also studied were some very inventive small-scale,

The play activities photographs are some of the many designed by Eric McMillan. The photos were taken in Toronto and San Diego.

Sesame, con't....

"The Ball Crawl" is an area filled with 40,000 plastic spheres that, amazingly enough, behave like water. Children are able to swim, float, burrow or even bury themselves in the mass of balls.

small-cost playgrounds that appeal to younger children as well as innovative pocket zoos, science and technology museums, and nature centers.

Most large theme parks provide mainly passive experiences, even though some of the rides border on the terrifying. However, CTW concluded that participation could be built into a small attraction that would appeal to families with children 3 to 12.

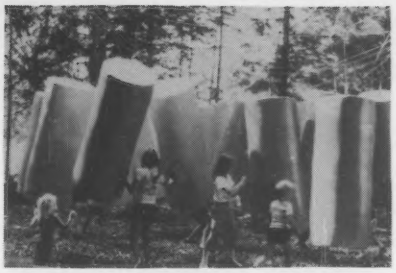
Enter Eric McMillan

A brilliant young British designer, now living in Toronto, has created five of the most imaginative playgrounds in the world today. Eric McMillan, and his creative style and philosophy include an appreciation and respect for children that make him a very congenial partner for CTW in its proposed venture into the commercial recreation industry.

Between CTW and Eric McMillan, an attraction has been created combining creative play with learning on several different levels. The creative physical play activities will be the main focus of the park, but it is by no means the entire story. Three other carefully designed and integrated participatory play and service features will be built around the McMillan physical play core.

Enter The Computer

One is a game center where the latest in innovative and challenging computer games and participatory science and technology exhibits will attract both children and adults.



These giant vinyl cylinders are filled with foam. For some children, it's a forest to explore; for others, it's a place to relieve pent up hostilities.

In another part of the building will be the food and beverage area which contains both a family restaurant and a fast food facility.

Finally, there will be a retail store where people can purchase Sesame Street and Electric Company products and other products related to the project itself.

The design of the attraction is such that the Game Center, restaurant and store can remain open as a self-contained unit when the play areas are closed.

Can Sesame Place Help CTW Grow Up?

The CTW management team working on the Sesame Place project envision capacity crowds practically from opening day in May 1980. They talk sanguinely about opening Sesame Place parks across the USA in suburbs and inner cities within a few years. What are the chances that CTW will succeed in its first major venture outside of media production?

On the positive side, an impressive array of talented people have been assembled. Most of them are outside of CTW or working on a "full-time consulting basis." In this way, CTW can hold down overhead and bypass the period needed to bring people "up to speed." The Busch Gardens people have certainly proved they can build and manage attractive and profitable theme parks.

However, the management track record of CTW itself is not nearly as impressive. "Sesame Street" and "The Electric Company" were, of course, wildly successful. However, the next productions were not nearly as triumphant. "Feeling Good," a health series that cost $7.1 million was panned by critics and taken off the air. "The Best of Families," a historical drama series overran its $6 million budget by $1.5 million and, even then, was disappointing.

A CTW subsidiary, Palm Productions, spent $1 million mainly exploring ideas for new productions and series. Its one and only movie, "Beauty and the Beast," with George C. Scott and Trish Van Devere got a lukewarm reception. Paul Firstenberg, CTW executive vice president, commented about the situation, "We stayed with Palm for so long (five years) because we liked the people, and to prove without all doubt that it couldn't work. We are not ruthless."

Only recently has CTW realized that it can't afford any more million-dollar lessons and it has begun to adopt a more business-like stance. CTW Communications, Inc., for example, was put under scrutiny with respect to the profitability of its two California radio stations and cable TV franchise in Hawaii. As a result, the radio stations are now up for sale. CTW admits it just didn't have the managerial capability to build up the radio properties.

Financial management has never been a strength of CTW. Joan Cooney, who started it all in 1969 is best at bringing people and ideas together and getting foundation funding. Most of the staff hail from the academic and non-profit world such as the Peace Corps, EEOC and various universities and foundations. But now with the Ford Foundation virtually out of public TV sponsorship and substantially diminished Office of Education funding, CTW must start behaving like a real business.

Today, most of CTW's money comes from licensing foriegn rights to "Sesame Street" ($2 million) and from licensing the manufacture of "Sesame Street" and "Electric Company" books and toys ($7.4 million). In 1978, for the first time, CTW funded 51% of the cost of "Sesame Street" from its profits. It is also contributing $1.5 million toward the development of a new science show series aimed at 8- to 12-year olds. It is doing all right, but it could do much better. As Paul Firstenberg admitted, "I wish that earlier the organization had been more concerned with the notion of business objectives cum educational goals. We would have been stronger. It's like growing up."

And there's no doubt that this "growing up" will be accelerated and enhanced by a year or two experience with Sesame Place.

Sesame con't...

The "Net Climb" gives children a chance to scramble through different levels of nylon netting and across swaying rope bridges in complete safety.

Enter Anheiser Busch

The concept of the Sesame Place Theme Park was presented to a number of potential development groups and sponsors. Anheiser Busch, builders of the successful and tasteful Busch Gardens Parks in Tampa, St. Louis and elsewhere, were intrigued by the project. In January 1979 Anheiser Busch signed on as backers of the Sesame Place Parks.

The first Sesame Place Park is scheduled to open in May 1980 at Oxford Valley, PA (near US Route 1 and Interstate 95). Hopefully, additional parks will open in rapid succession once the concept is proved successful.

Architectural model of Sesame Place. The park consists of three 15,000 sq. ft. play courtyards and 35,000 sq. ft. of enclosed space.

Focus on Participation

Throughout the entire park, the name of the game is participation. There are no thrill rides, as such, at "Sesame Place, although many of the rope rides and other play activities carry their own form of excitement and adventure. Each element of the project invites interaction and active use, giving the child opportunity to develop in terms of self expression, motor skills and general creativity in a fun environment.

Another characteristic of the park is its free-flowing nature. Young customers won't be processed through in groups; they can, and will gravitate to the places where they can have the most fun.

The "Sesame Place" concept is designed for visits of two or three hours with repeat visits throughout the year.

As the accompanying photos show, the list of possible activities is almost limitless. CTW is convinced after watching families enjoying the McMillan play areas that an attraction containing Eric's form of "child's play," when combined with the Workshop's proven ability to entertain, will be a fun and purposeful play experience for the child, a wholesome activity for the family and a profitable venture for all concerned.

Sesame Place Game Center

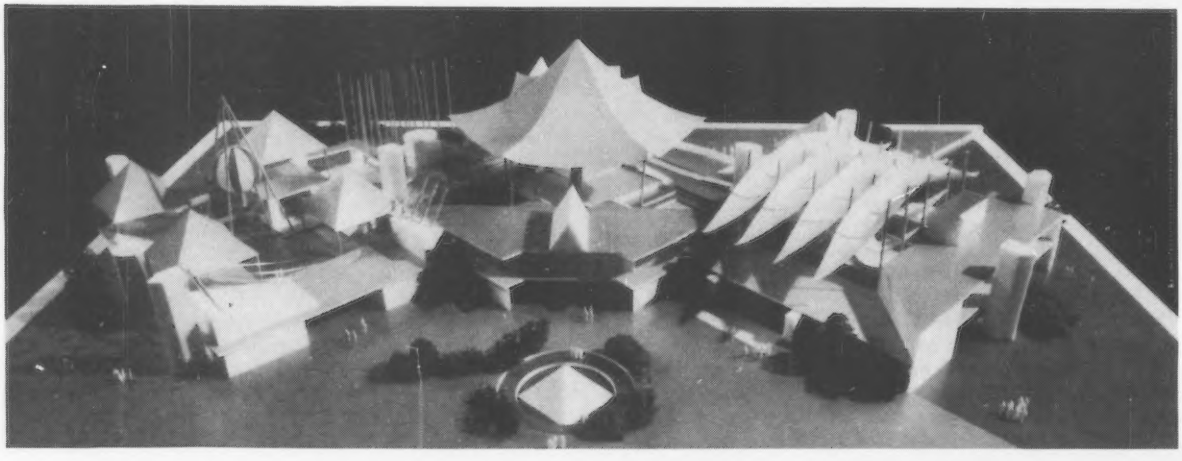
General Concept

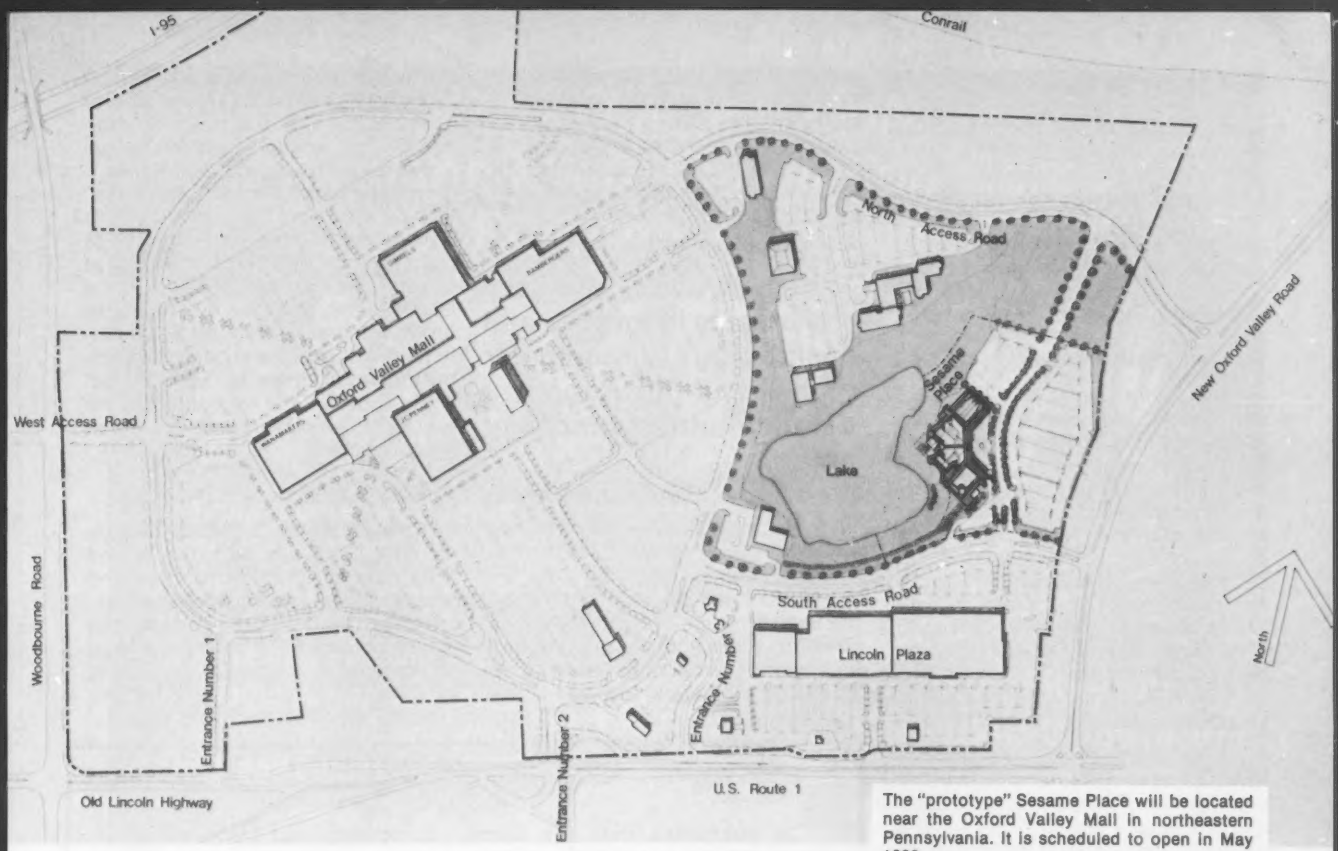
The Game Center comprising about 6000 square feet, will be designed to blend the fun, excitement and proven appeal of the traditional game arcade with the educational goals—and wholesome image—of the Children's Television Workshop. To do so, it will combine concepts and elements culled from the rapidly growing fields of micro-computers, computer games and computer-assisted instruction; from existing arcades and "game rooms;" from exhibits and "hands-on" activities found in science museums; from video technology; and from television programming produced by CTW and others. In all, there will be more than 70 games and exhibits for visitors to choose from.

"The Foam Swamp" is a sheet of vinyl covering a field of different density foams. The density determines how far the child sinks in with each step — the results are surprising and hilarious for both older and younger participants as well as their observing parents.

Broad Age Appeal

A sampling of new, simple games and activities, perhaps augmented by audio instructions to bring them within the range of those who have not yet learned to read, will guarantee that young children, even pre-





The "prototype" Sesame Place will be located near the Oxford Valley Mall in northeastern Pennsylvania. It is scheduled to open in May 1980.

meca announces

beta-1 The stand-alone Tape Storage System.

BETA-1 is the answer to the many requests MECA has received for a universal tape unit. So we are proud to present the first mass storage solution for non-S100 bus microcomputers. Now you can own a BETA-1 complete, assembled and tested, for only $399.

STANDARD FEATURES

- Random seek to file at more than 100 inches per second.
- Typical access time is 10 seconds or less.
- Plugs directly into standard 8-bit parallel I/O port.
- Fast load time at 8000 bits per second.
- Reliable — Uses professional phase-encoding technique.
- Internal 8035 microprocessor with 1K byte program.
- Self-contained high level operating system.
- Up to 1 megabyte on-line with a single drive.
- Replaces disk at a fraction of the cost and delivers similar performance.
- Interfaces to most popular microcomputers and requires only a parallel or serial port.

OPTIONAL ACCESSORIES

- Serial I/O Port
- Double the loading speed for 16,000 bits per second.

The **BETA-1** will interface easily to most popular microcomputers. Delivered assembled only (sorry, no kits). Limited quantities available from first production run, SO ORDER NOW!

Dealer inquiries welcomed.

meca

Sound too good to be true? Then judge for yourself and place your order today. Call **MECA**, or your favorite dealer, for more details.

7026 O.W.S. Road, Yucca Valley, CA 92284
(714) 365-7686

Sesame con't....

schoolers, will find plenty to do in the Game Center. At the same time, games and exhibits stimulating and challenging enough to keep adults interested for hours will also be offered. Many games will offer multiple skill-level options so that children and adults, or older and younger siblings, can play together.

No "Carny" Atmosphere

The Game Center will be bright and cheerful, but less garish, quieter, more tastefully designed, and more conducive to reflective as well as high-energy play than, say, the arcades typically found in shopping centers or theme parks. While many of the better games developed for arcade use—"Breakout," "Touch-Me," "Surround," for example—will be available at our Center, ones based on violence or combat will be eliminated, or rethemed.

Educational Aspects

In addition to the general goals of helping children (and adults) develop hand-eye coordination and/or gaming strategies, specific attractions within the Center will help visitors learn concepts and skills in such specific curriculum areas as science, reading (and "pre-reading"), music and art, history, logic, creative writing, and the social sciences. Many games and activities will encourage visitors to learn something new about themselves and the way they perceive their environment. Participatory exhibits and film presentations will be chosen—and placed—so as to reinforce the educational value of specific games (e.g., a tilted hydraulic cylinder which a visitor enters and tries to align might be jextaposed with a computer game in which the player tries to level a tilted rocket or airplane; a generator which a visitor pedals to produce energy might stand next to a computer simulation on power plant management, etc.). Finally, one of the curriculum goals of the Game Center will be to demystify computers—to give visitors a sense of what they are and how they work.

Flexibility and Personalization

Because micro-computers are far easier to program and re-program than the "dedicated" game machines found in traditional arcades, new games can be added—and unpopular ones scrapped—on a continuing basis. Thus, the Game Center will remain fresh and interesting; and it will keep improving. Furthermore, the keyboard input devices inherent in many of the games will make it possible for machines to call visitors by name, and to tailor game-selection and difficulty level to the age of each individual player.

The Game Center will have the latest in innovative and challenging computer games and participatory science and technology exhibits.

Every arcade has money changers and technicians on staff. Those in Sesame Place will double as "Explainers" (to use a term coined by the Exploratorium in San Francisco)l cheerful, accessible people who can help visitors understand basic techniques (or strategies) involved in the games, or recommend a new exhibit that might be of particular interest, or even provide a useful tidbit of information that will increase the educational value of one's stay in the park.

Most arcades are "plunked down" in their settings—they are entities in themselves that bear little relation to the parks or shopping malls that contain them. The Sesame Place Game Center, however, is designed to be an integral part of its surroundings. It will echo, and carry forward, the themes of active participation and self-discovery that characterize the Eric McMillan playground with which it's connected.

The Muppets Too!

The voices of Big Bird, Cookie Monster, Ernie and Bert, Grover and Company will explain games and exhibits to youngsters (and adults, too), and their familiar images and personalities will be an integral part of many of our games, films and exhibits.

The Players

To guarantee that the Game Center will be entertaining, educational—and commercially viable—a remarkable creative team has been assembled. In addition to designer Eric McMillan mentioned above, the team includes the following:

The Atari Company, pioneers in the creation of electronic games for arcade and home use, will advise on game selection, engineering, operations and game center economics. They will also be a major supplier of game equipment, much of it custom-engineered for project.

The Exploratorium. Considered by many to be the most innovative science museum in the world, this San Francisco institution will design and built many of the exhibits and "hands-on" activities that will be included in the Center. The Exploratorium's Founder and Director, Frank Oppenheimer, will also serve as an educational consultant to the project.

Lawrence Hall of Science. This institution has been a pioneer in the field of public computer education. The Hall has agreed to serve as a game-development and research resource for the Game Center.

Creative Computing. This New Jersey-based company, as a result of its magazine, **Creative Computing**, and a wide range of books, tapes and games it has developed, is generally considered to be the country's leading source of computer game software for small systems. The company's Director, David H. Ahl, and his able staff of programmers, will play an important role in creating, selecting, programming and modifying the games that will be used in the Center.

Marin Computer Center is a unique facility in San Rafael, California, where members can use computers, for an hourly charge of $1.50, to play games, solve business problems or even design their own programs. David and Annie Fox, Founders and Directors of the Marin Center, will assist in game and hardware selection, and act as educational consultants.

The Sesame Street creative and educational staffs have been pioneers in the use of media—first television, then books, records, toys and games—to provide "learning through fun." The same team of writers, producers, researchers and educators who put together the world's most succesfull educational television show will be deeply involved in every aspect of the creation—and operation—of the Game Center.

The One and Only Airplane Flight Simulation Game For Personal Computers!

MAYDAY!

Imagine you're the pilot of a private airplane. Three miles from your destination you run out of gas. One thing is now certain: you are going down! Can you save yourself? Or will you crash and burn?

Available on Hayden Computer Program Tapes for the PET!

That's the challenge of **MAYDAY!** — a game that will test your concentration, judgment, and agility. To land the plane safely, you'll learn the basic principles of flight. You'll learn to control three forces acting upon an aircraft in flight (lift, weight, and drag). You'll learn to flare at the proper moment. You'll learn to control your vertical speed and to recognize ground effect. And you'll use the ILS and VASI landing aids. You'll have to learn all these things or you'll crash every time. That's the challenge of **MAYDAY!**

You'll have hours of fun and excitement with **MAYDAY!** But, once you land safely, the challenge is not over. Because each time you play, you start at a different altitude. So, what worked for one flight will not necessarily work for the next! That, too, is the challenge of **MAYDAY!**

MAYDAY! comes completely ready to run on your PET. There's no need to debug the program or add input. Plug it in and you're ready to fly! Or to crash! So, for hours of challenge and excitement, get the one and only airplane flight simulation game for personal computers!

MAYDAY!

by Paul J. Breitenbach,
#02601, $9.95

For more hours of fun and games with your personal computer, check out these other Hayden Computer Program Tapes:

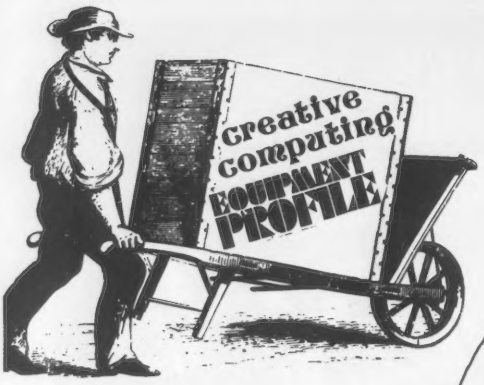
- SARGON: A COMPUTER CHESS PROGRAM
- GAME PLAYING WITH BASIC
- THE FIRST BOOK OF KIM
- HOW TO BUILD A COMPUTER-CONTROLLED ROBOT
- CROSSBOW

Available at your local computer store!

HAYDEN *your software supplier!*

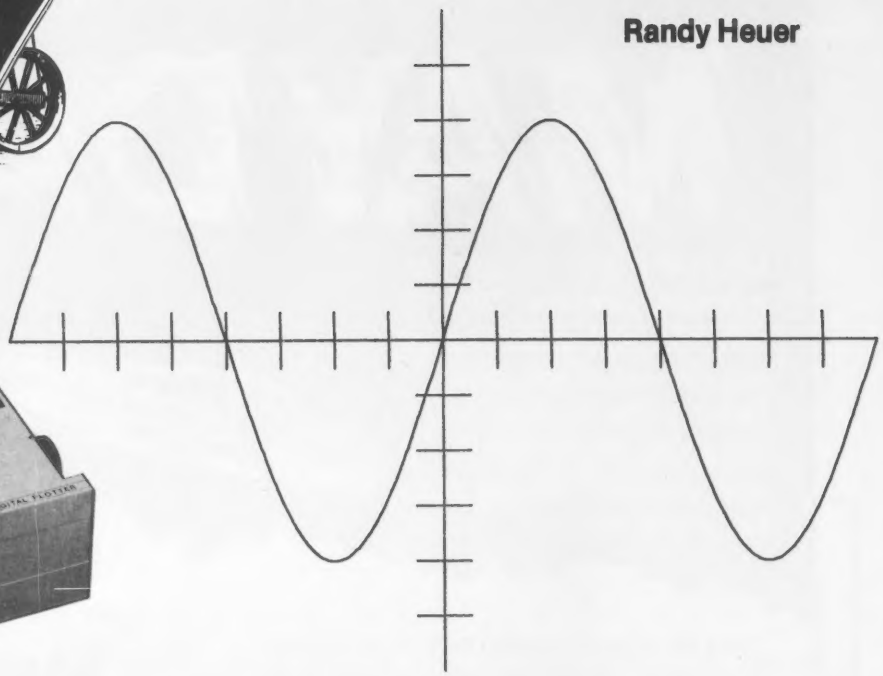
Hayden Book Company, Inc.
50 Essex Street, Rochelle Park, NJ 07662

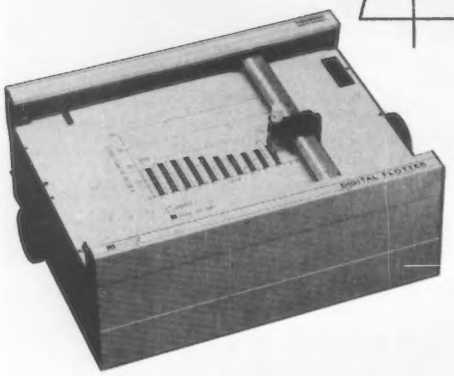
CIRCLE 154 ON READER SERVICE CARD



HIPLOT Digital Plotter

Randy Heuer





Some of you might wonder, "Why would I want a digital plotter?". Well, there are a number of good reasons for owning a plotter. Perhaps you use your computer for design purposes and need hardcopy drawings. Maybe you want to demonstrate your artistic talent in a new form. You might even be one of those fortunate people who have every computer component that they really need and have a little money to spare.

Whatever the case, a plotter such as the Houston Instrument HIPLOT Digital Plotter may be the type of device you are searching for. A plotter provides a hardcopy output that a printer can't provide. It allows you to create a variety of shapes, both characters and noncharacters, with a high degree of resolution.

The HIPLOT Plotter

The HIPLOT plotter is a flatbed plotter. This means that the plotting paper remains stationary on a flat surface and the pen moves on an arm above the paper. Its actual plotting area is 7" x 10", although the bed will hold an 8½" x 11" sheet. The overall size of the unit is 10½" x 13½" x 5". The pen arm is driven by two motors providing pen movement in two directions. Communication with the plotter is accomplished through a RS-232C serial port or a 6 line TTL input. For serial communications, the user may select baud rates of 300, 600, 1200, 2400, 4800 or 9600 by repositioning a jumper on the communications cable. The price of the unit including pens, paper and line cord is $1085.

Here at Creative, we decided to connect our plotter to our unused Xitan serial teletype port which is set to 9600 baud. This allowed us to use LPRINT statements to pass commands to the plotter. After wiring a cable as specified in the plotter documentation and configuring the computer for 9600 baud, we connected everything. The plotter worked the first time and has performed flawlessly since. All we needed next was some software.

"Is That How It Works?"

For the most part, the plotter will do very little without supporting software that the user develops. To coin a term, I would call this plotter a "dumb plotter." I don't use the word "dumb" in a derogatory manner, but in the same context as the term "dumb terminal." Let's look at exactly what the plotter "knows."

From what you've read so far, you may be under the impression that a plotter is an analog (continuous) device. That is, that you can have the pen move to any place on the plotter's bed. This is not really true, though. Almost all plotters are incremental devices, and the HIPLOT is no exception.

In the HIPLOT, we find that we are dealing with increments of either .01" or .005". By placing a jumper on the input cable, you can choose the appropriate step size for your needs. I chose to use the .005" increment.

```
.-x,+y   .+y    .+x,+y

.-x      .      .+x

.-x,-y   .-y    .+x,-y
```

Figure 1. Plotter Increments.

Figure 1 explains the mystery of increments in the HIPLOT further.

Imagine each dot to be .005" from its horizontal and vertical neighbors. The plotter's pen is located at the central dot. The commands that we can give the plotter tell it to move the pen to any one of the eight adjacent dots. The pen cannot stop anywhere in between, and it knows nothing about where it has been. After moving, the pen now finds itself at a new central dot with eight neighbors.

I hope the preceding discussion hasn't been too confusing, but it demonstrates the basic "knowledge" of the plotter. The plotter only knows how to move the pen one increment (.005" in this case) in any of eight directions and also how to pick the pen up and put it down on the paper. The serial interface in the HIPLOT recognizes certain lower case ASCII character codes to perform these tasks (Figure 2).

ACTION	ASCII CHARCTER
+y	p
+x,+y	q
+x	r
+x,-y	s
-y	t
-x,-y	u
-x	v
-x,+y	w
Pen UP	y
Pen DOWN	z

Figure 2. Plotter Control Codes.

For example, to have the plotter place the pen on the paper with the particular machine configuration I used, you would enter LPRINT "z".

As you can see, the instruction set for the HIPLOT is rather limited. I have worked with more sophisticated plotters which had a larger set of commands that could be used. However, they generally cost thousands of dollars more than the HIPLOT and would interface with only one particular type of computer. With the HIPLOT, you get a slightly less sophisticated device for less money and you supply the sophistication with your programming skills.

An Example

I have prepared a demonstration program (shown in Figure 3) for producing an x,y axis and a sine curve. The resulting plotter output is shown in Figure 4. The program is a bit more complex than need be, but is representative of the type of software you would want to develop to make the plotter more versatile.

The heart of the program is the vector drawing subroutine at line 1000. It was adapted from the routine provided in the HIPLOT instruction manual. Its function is to move the pen X increments (.005") in the x-direction and Y increments in the y-direction, taking the shortest path. In other words, it draws a straight line to a point (X,Y) increments from the present pen position. You set the pen up or down prior to calling the subroutine.

So if you wanted to draw a one inch line to the right, you'd use this sequence:

```
100 LPRINT "z":REM  PEN DOWN
110 X=200
120 Y=0
130 GOSUB 1000
```

The axis drawing routine (line 2000) and the curve drawing routine (line 4000) use the vector drawing routine to do all of their pen movement. The scaling routine (line 3000) provides scaling factors (XS,YS) so that direct conversion from function values to plotter coordinates can be made. The input for the program controls the size of the axis, the spacing for the tics and the scaling for the axis.

If you are considering purchasing a plotter like the HIPLOT, you should be aware that this type of programming will be required. However if you construct your routines carefully, you will be able to use the same routines for a variety of purposes.

Conclusion

So for those who are interested in adding a digital plotter to their computer system, I would encourage you to give serious consideration to the HIPLOT from Houston Instruments. It's relatively low price and ability to interface with a number of computer systems makes it an ideal device for those who want to own a plotter and are willing to develop the software to operate it. □

```
RUN
ENTER LENGTH OF X-AXIS IN INCHES? 8
ENTER LENGTH OF Y-AXIS IN INCHES? 6
ENTER NUMBER OF TICS PER INCH ON X-AXIS? 2
ENTER NUMBER OF TICS PER INCH ON Y-AXIS? 2

PREPARE SCALING FACTORS

ONE INCH ON X-AXIS =? 1.5708
ONE INCH ON Y-AXIS =? .5

ANOTHER GRAPH? NO
Ok
```

COMPUTER POWER FOR BUSINESS

SUBSCRIBE TO THE MAGAZINE THAT COVERS EVERYTHING YOU NEED TO KNOW ABOUT CHOOSING AND USING COMPUTERS.

- The best computer for your business
- How business people use microcomputers
- Computer primer
- Introduction to business software
- Answers to your questions
- Advice from experts
- How to deal with suppliers
- Computer profit windfalls and hidden costs
- Best buys in computer equipment
- Scanning the stockmarkets
- Computer contracts
- Service bureaus vs. in-house computers
- Small computers in large corporations

Small Business Computers Magazine
33 Watchung Plaza, Montclair, NJ 07042

SUBSCRIBE NOW!
One year for only $9!
(½ newsstand price)
subscription fee may be business expense tax deductible

☐ Check Enclosed ☐ Bill me

CC-6/79

Name _____

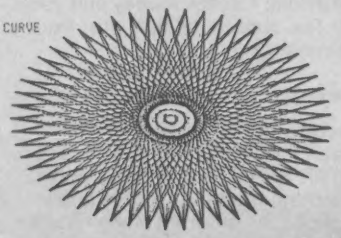
Address _____

Company _____

City/State _____ Zip _____

CIRCLE 146 ON READER SERVICE CARD

```
1 REM ************************************************************
2 REM
3 REM           SINE CURVE PLOT FOR MIPLOT DIGITAL PLOTTER
4 REM
5 REM************************************************************
6 REM      FOR USE WITH .005" INCREMENTS
7 REM
8 REM      REQUIRED SUBROUTINES
9 REM
10 REM      VECTOR DRAWING ROUTINE-AT LINE NUMBER 1000
11 REM      AXIS DRAWING ROUTINE-AT LINE NUMBER 2000
12 REM      AXIS SCALING ROUTINE-AT LINE NUMBER 3000
13 REM      FUNCTION DRAWING ROUTINE-AT LINE NUMBER 4000
14 REM
15 REM ************************************************************
16 REM   MAIN PROGRAM VARIABLE LIST
17 REM         XP-X PEN POSITION
18 REM         YP-Y PEN POSITION
19 REM************************************************************
20 XP=0
30 YP=0
40 GOSUB 2000
50 GOSUB 3000
60 GOSUB 4000
70 PRINT:INPUT "ANOTHER GRAPH";A$
80 IF LEFT$(A$,1)="Y" THEN 50
90 END
1000 REM************************************************************
1001 REM
1002 REM     VECTOR DRAWING ROUTINE
1003 REM
1004 REM ************************************************************
1005 REM FUNCTION-MOVE PLOTTER PEN A DISTANCE OF X,Y UNITS FROM
1006 REM          PRESENT PEN POSITION.
1007 REM************************************************************
1008 REM
1009 REM  INPUT-  X-DISTANCE TO MOVE PEN IN X DIRECTION
1010 REM          Y-DISTANCE TO MOVE PEN IN Y DIRECTION
1011 REM************************************************************
1030 F=ABS(X)+ABS(Y)
1040 IF F=0 THEN 1470
1050 D=ABS(Y)-ABS(X)
1070 A$="pqrqrststuvuvwpw"
1080 I=0
1090 IF Y<0 THEN 1210
1200 I=2
1210 T=X+Y
1220 IF T<0 THEN 1240
1230 I=I+2
1240 T=Y-X
1250 IF T<0 THEN 1270
1260 I=I+2
1270 IF X<0 THEN 1300
1280 I=8-I
1290 GOTO 1310
1300 I=I+10
1310 IF D<0 THEN 1350
1320 T=ABS(X)
1330 D=-D
1340 GOTO 1360
1350 T=ABS(Y)
1360 E=0
1370 Z=T+D+E+E
1380 IF Z<0 THEN 1430
1390 E=E+D
1400 F=F-Z
1410 LPRINT MID$(A$,I,1)
1420 GOTO 1460
1430 E=E+T
1440 F=F-1
1450 LPRINT MID$(A$,I-1,1)
1460 IF F>0 THEN 1370
1470 XP=XP+X
1480 YP=YP+Y
1490 RETURN
2000 REM************************************************************
2001 REM
2002 REM          AXIS PLOTTING SUBROUTINE
2003 REM
2004 REM************************************************************
2005 REM  FUNCTION-PRODUCE A VARIABLE SIZE CARTESIAN COORDINATE AXIS
2006 REM************************************************************
2007 INPUT "ENTER LENGTH OF X-AXIS IN INCHES";XA
2008 INPUT "ENTER LENGTH OF Y-AXIS IN INCHES";YA
2009 INPUT "ENTER NUMBER OF TICS PER INCH ON X-AXIS";XT
2010 INPUT "ENTER NUMBER OF TICS PER INCH ON Y-AXIS";YT
2011 LPRINT "y"
2012 REM   PLOT X-AXIS
2020 X=-100*XA
2030 Y=0
2040 GOSUB 1000
2050 X=200*XA
2055 LPRINT "z"
2060 GOSUB 1000
2070 X=-XP
2080 Y=100*YA
2085 LPRINT "y"
2090 GOSUB 1000
2098 REM  PLOT Y-AXIS
2100 X=0
2110 Y=-200*YA
2120 LPRINT "z"
2130 GOSUB 1000
2135 REM   PLOT TICS ON X-AXIS
2140 X=-XP
2150 Y=-YP-50
2153 LPRINT "y"
2155 GOSUB 1000
2160 DX=-1
2165 DIS=0
2170 LPRINT "y"
2180 Y=100
2190 X=DX*200/XT
2195 XX=X
2200 GOSUB 1000
2210 LPRINT "z"
2220 Y=-100
2230 X=0
2240 GOSUB 1000
2250 DIS=DIS+XX
2253 IF ABS(DIS+XX)<100*XA THEN 2170
2255 IF DX=1 THEN 2300
2260 X=-XP
2270 Y=-YP-50
2273 LPRINT "y"
2275 GOSUB 1000
2280 DX=1
2290 GOTO 2165
2295 REM    PLOT TICS ON Y-AXIS
2300 X=-XP-50
2310 Y=-YP
2320 LPRINT "y"
2330 GOSUB 1000
2340 DX=-1
2350 DIS=0
2360 X=100
2370 Y=DX*200/YT
2375 YY=Y
2380 LPRINT "y"
2390 GOSUB 1000
2400 LPRINT "z"
2410 X=-100
2420 Y=0
2430 GOSUB 1000
2440 DIS=DIS+YY
2450 IF ABS(DIS +YY)<100*YA THEN 2360
2460 IF DX=1 THEN 2510
2470 Y=-YP
2480 X=-XP-50
2483 LPRINT "y"
2485 GOSUB 1000
2490 DX=1
2500 GOTO 2350
2510 LPRINT "y"
2520 X=-XP
2530 Y=-YP
2540 GOSUB 1000
2550 RETURN
3000 REM************************************************************
3001 REM
3002 REM          AXIS SCALING FUNCTION
3003 REM               FOR USE WITH .005" INCREMENTS
3004 REM************************************************************
3005 REM   FUNCTION-SCALE AXIS FOR DIRECT CONVERSION
3006 REM************************************************************
3007 REM  OUTPUT-XS-SCALING FACTOR FOR X-AXIS
3008 REM         YS-SCALING FACTOR FOR Y-AXIS
3009 REM************************************************************
3010 PRINT:PRINT "PREPARE SCALING FACTORS"
3011 PRINT
3020 INPUT "ONE INCH ON X-AXIS =";XI
3030 INPUT "ONE INCH ON Y-AXIS =";YI
3040 XS=200/XI
3050 YS=200/YI
3060 REM SCALING FACTORS IN XS,YS
3070 RETURN
4000 REM************************************************************
4001 REM
4002 REM           PLOT SINE CURVE
4003 REM
4004 REM************************************************************
4005 REM   FUNCTION-PLOT SIN CURVE ON SCALED GRAPH
4006 REM************************************************************
4010 REM  FIRST MOVE PEN TO STARTING LOCATION
4020 X=-2*3.14159*XS
4025 XL=X
4030 Y=SIN(-2*3.14159)*YS
4035 YL=Y
4040 LPRINT "y"
4050 GOSUB 1000
4060 REM   NOW PLOT ACTUAL CURVE
4070 LPRINT "z"
4080 FOR J=-2*XS TO 2*XS
4090 X=INT(J*3.14159-XL)
4095 XL=INT(J*3.14159)
4100 RD=(J/XS)*3.14159
4110 Y=INT(SIN(RD)*YS-YL)
4115 YL=INT(SIN(RD)*YS)
4120 GOSUB 1000
4130 NEXT J
4140 X=-XP
4150 Y=-YP
4160 LPRINT "y"
4170 GOSUB 1000
4180 RETURN
Ok
```



INTRODUCING G2 LEVEL III BASIC.

Now do more than ever before with the most powerful Basic you can buy for the TRS-80.

Open the manual and load the cassette. Then get ready to work with the most powerful Basic interpreter you've ever had your hands on...Level III Basic for Radio Shack Computers. It loads right on top of the Level II ROM, and in just 5K of space, opens up your capability to new dimensions. For starters, this new cassette-based interpreter gives you the whole catalog of disk programming power. Plus graphics commands. Plus powerful editing commands. Plus long error messages, hex and octal constants and conversions, user defined functions and a number of commands never before available on either cassette or disk interpreters!

Easier Loading, Fewer Keyboard Errors. G2 Level III Basic eliminates aggravations you've had, including keyboard "bounce" and those super-sensitive tape deck settings. Programs will load easier, and you'll have far less trouble with input errors.

Basic Access to RS-232. Until now, if you wanted to access your RS-232 interface, you had to work in assembly language. G2 Level III Basic does the work for you, letting you use your interface with Basic statements.

Have You Wished for More Power? This new interpreter gives you 10 machine language user calls for subroutines, long error messages, a new TIME$ call for your real time accessory, plus measure or limit input timing that lets you put a time limit on responses when you're playing games or giving exams. And the list doesn't stop here.

Easier and More Powerful Graphics. This new Basic includes three simple commands that can eliminate dozens of program steps. PUT transfers information from a designated array to your screen; GET reverses the process. LINE makes your computer do the work when you input beginning and end points. Give it two diagonally opposite corner locations, and it'll outline the rectangle you're looking for.

Only Microsoft Could Do It. G2 Level III Basic was created by Microsoft, the same company that wrote Level II Basic for Radio Shack. And it actually uses Level II as a foundation for this enhanced add-on. By the time you've mastered all it can do, calling up the flexibility of the graphics commands, and even enjoying the convenience of renumbering, you'll wonder how it was all possible. It's like getting a whole new computer for your computer.

Available Now for Only $49.95. You get the power that might otherwise cost you hundreds of dollars in additional equipment for only $49.95. Price includes the User Manual, a Quick-Reference Card, and a preprogrammed cassette tape. Load the tape, open the manual, and get ready to work with the most powerful Basic Interpreter you've ever had your hands on. G2 Level III Basic for the TRS-80. Another member of the growing G2 Personal Computer Program Library.

For the name of the G2 dealer nearest you, call us toll-free at 800/538-8540 or 800/538-8541. In California, please call 800/672-8691.

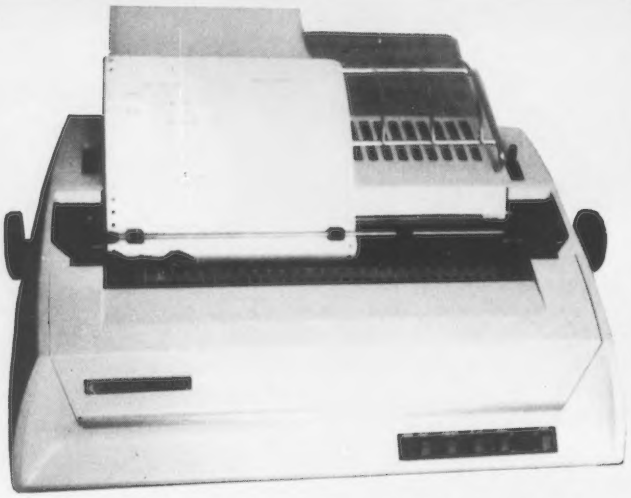
THE REASON YOU BOUGHT YOUR COMPUTER. G2™

GRT® CORPORATION
A Product of GRT Corporation
Consumer Computer Group
1286 North Lawrence Station Road, Sunnyvale, California 94086, 408/734-2910

CIRCLE 143 ON READER SERVICE CARD

Computer Graphics With the Diablo

Tom McDonough



There are a few "ins and outs" you should be aware of when it comes to generating graphics with your Diablo.

The Diablo HyTerm is the Cadillac of microcomputer printers. Not only is it a superb character printer, it is also able to plot graphics. However, there are many tricks to getting this printer to plot. This article describes software that does those tricks for you.

The software was tested on a Diablo 1610 printer, using a Sol 20 microcomputer and North Star disk BASIC. (The 1610 model is the same as the 1620, except that the latter has its own keyboard.) Enough information is given here to enable the user to adapt the software to other systems.

These Diablo printers use a daisy wheel, which is a flat, flower-like disk with the typewriter symbols formed in raised letters on the "Petals" of the daisy. When the printer receives the command to print a character, motors rotate the wheel and slide it horizontally, putting the proper "petal" into position. Then a solenoid hits the "petal" like a hammer. The printer contains a microprocessor of its own, independent of the computer's, and does the complex job of timing the whole show. All your computer has to do is send the ASCII (American Standard Code for Information Interchange) code to the printer, and it prints the character. If it is a control character (e.g., line feed, carriage return, etc.), it does the appropriate movement.

At first, it would seem that the easiest thing to do in BASIC is to use the PRINT statement. This works, but in order to transmit the control characters, you have to be tricky. Some BASICs allow you to output a control character by putting it in the PRINT statement in a special way. In Processor Technology BASIC 5, for example, an ampersand (&) in a string outputs the CONTROL value of the next character. In North Star BASIC, PRINT CHR$ (X) will output X, where X is the decimal value of the ASCII control character.

There is a subtle problem with the PRINT statement, however. It is difficult to prevent the printer from doing an automatic carriage return and line feed. A comma at the end of the PRINT statement will prevent this problem, but only for a fixed number of times. When the software is set for a 64 character line, it will do up to 64 PRINTs, and then do a carriage return and line feed. The new North Star Release 4 BASIC allows you to defeat this feature by making the software think that the printer is still at the beginning of the line. In the standard version of this software, personalized for the Sol 20, this statement will do the trick:

```
FILL 21841,0
```

Alternatively, you could use the variable-spacing feature of the Diablo, discussed below. A simpler way was chosen for the present software: use of the OUT statement.

The OUT instruction is similar to the OUT statement in assembly language. In order to use it in BASIC, you need to know the output port number of your printer. This is not always as trivial as it sounds. In the Sol 20, most functions use a pseudoport number, which is a convenience, not the actual port number used inside the machine. By searching through the manual, the persistent explorer will discover in the back of Appendix 7, that the serial output port (used by the Diablo), usually called pseudoport number 1, is actually port number F9. This, however, is in hexadecimal, and must be converted to the decimal number 249 to be understood by the BASIC interpreter.

From a table of ASCII codes, you can find out which numbers correspond to which control characters. But be sure to use decimal ASCII codes, not the octal or hexadecimal numbers that are often encountered in ASCII tables. If, for example, you want to do a line feed, you will find that the ASCII code is 10. Thus, the following BASIC statement will cause the printer to do a line feed:

```
OUT 249,10.
```

If your interpreter will not accept any of the above commands, you may have to use the assembly language OUT statement, or the machine language equivalent, which for the 8080/8085 systems is the hexa-

Photo 2. The author's system: A Sol-20 microcomputer and North Star minifloppy disk memory, built from kits, and a Hitachi 9" video monitor. The Diablo 1610 printer is at left. Blonde is not part of system.

Tom McDonough, 1299 Cordova, Suite 206, Pasadena, CA 91106.

decimal code D3.

Now you have the magic key that opens up the full power of the Diablo. Almost.

The Diablo accepts some special codes, combinations of two or three ASCII characters that cause it to behave like a plotter rather than a printer. For example, if it receives the ESCAPE character (ASCII 27), followed by the ASCII code for the number 3, then it turns on the Graphics Mode. (Remember that ASCII perversely does not use 3 as the code for the number 3. Instead, when you hit the key labeled 3, it generates the ASCII decimal code 51.) In other words, to turn the Graphics Mode on, you need to output the numbers 27 and 51, in that order, to the printer.

At first glance, an easy way to do this would be by the BASIC statements:

```
OUT 249,27
OUT 249,51
```

This works for some of the Diablo special commands, but not all. The reason is that the computer can send commands faster than the Diablo can obey them. In practice, I have found it necessary to insert a time delay between successive OUT commands:

```
OUT 249,27
FOR K = 1 TO 10
NEXT K
OUT 249,51
```

Faster computers may require more delay. You should experiment with your machine to make sure you have enough of a delay to turn on all of the Diablo special control functions. Because of the need to call this time delay every time you output these functions, it is better to put it in a subroutine:

```
1270 OUT 249,I9
1280 FOR K9 = 1 TO 10
1290 NEXT K9
1300 RETURN
```

Throughout the software, variables will be written with 7, 8, or 9 in their name. This is because the software is meant to be used as a subroutine with other computer programs, and it is safer to use subroutine variables that are unlikely to occur in the main program.

To call this subroutine, you set I9 to the needed ASCII code. Now to output 27,51 you do this:

```
I9 = 27
GOSUB 1270
I9 = 51
GOSUB 1270
```

What happens in the Graphics Mode? In this mode, the movement of the print head and carriage no longer are automatic. Whereas in the Print Mode, the head will move one space to the right every time it prints a character, in the Graphics Mode, the head will sit right where it is until you tell it to move. If you output the ASCII SPACE character, instead of moving 1/10" to the right, it will move 1/60". Similarly, doing a LINE FEED will roll the paper 1/48" instead of the usual amount.

This seems like just what the doctor ordered for doing graphics, yet here is the next trick: The best way to do graphics with the Diablo is to avoid the Graphics Mode! The reason is that there is another mode which allows the horizontal movement to be half the size of the Graphics Mode. (Unfortunately, the vertical movement can never be less than the 1/48" of the Graphics Mode.)

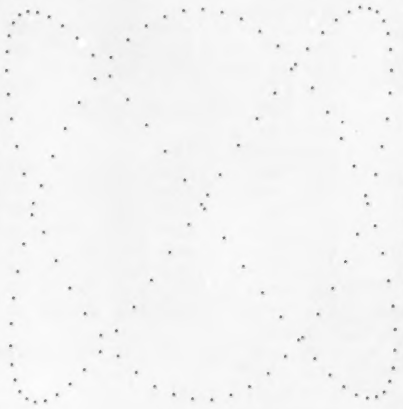


Fig. 1. Lissajous figure drawn by the program, with J running in intervals of 0.5 instead of 1. This plot was 7" x 7" in the original.

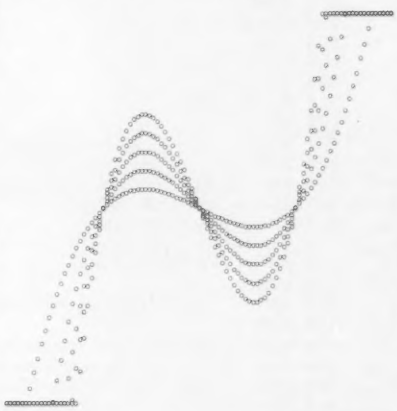


Fig. 2. Plot of the cubic equation Y = A*X*(X-1)*(X+1), printing the lower-case letter "o" instead of period. The constant A was set from 0.5 to 2.5 in steps of 0.5. The ranges of X and Y were set from -2 to +2, and X was taken in steps of 0.04. The plot was 7" x 7" in the original.

To get into what I will call the High-Precision Mode, you use the Diablo Horizontal Motion Index (HMI). This allows you to set the horizontal step size to any multiple of 1/120", up to about an inch. In particular, outputting the decimal codes 27, 31, 2 sets the HMI to 1/120". (The last digit, 2, sets the amount of the HMI. The printer subtracts 1 from this number. Setting it equal to 1 would give no motion; 3 would give you a spacing of (3-1)/120 = 1/60"; setting it to its maximum, 126, would give a spacing of (126-1)/120 = 1.04".) In our software, we will use the name S8 for the horizontal step size and output 27, 31, (S8 + 1) to set the HMI.

Analogously, you can set the Vertical Motion Index (VMI) to its minimum, 1/48", via the sequence 27, 30, 2. In our software, the vertical step size is called S9, and 27, 30, (S& + 1) sets the VMI.

In this High-Precision Mode, the printer acts exactly as it does in the ordinary printer mode, except that now all movements are shrunk or stretched to their set sizes. When the computer outputs a space (ASCII code, 32), the print head moves one horizontal unit to the right. A linefeed (10) will roll the paper one vertical unit down.

To make full use of this mode, you must be able to do backspaces and negative linefeeds. The backspace has its own ASCII code (8); the negative linefeed is given by the escape character followed by a regular linefeed (27, 10).

With this knowledge, you can now understand the accompanying high-precision graphics program.

The Software

The software is designed for a normal paper orientation, i.e., it assumes that you have put the paper in the usual way, with the top margin of the paper just visible.

The subroutine is given the coordinates of a point (X9, Y9) by the main program. The X axis is the horizontal one; the Y axis, the vertical. The X coordinates are assumed to range from a minimum value of X7, to a maximum of X8; similarly, Y ranges from Y7 to Y8. The program as written assumes that X9 and Y9 range from -1 to +1, but these may be easily changed by altering lines 480 through 510. The plot will be a maximum of W9

Diablo, con't....

inches wide and L9 inches long, where W9 and L9 are currently set to 8 inches. (Lines 440 and 450.)

This is how we plot the first point, coordinate X9: We locate it on the X axis, remembering that the range of X is from X7 to X8. Thus, the mathematical length of the X axis is (X8-X7) units, which must correspond to an actual width of W9 inches. One unit then equals W9/(X8-X7) inches. Since the point X9 is (X9-X7) units from the left end of the axis, X9 must be (X9-X7)*[W9/(X8-X7)] inches from the left margin. Since the printer prints in horizontal steps of S8/120 inches, this means that X9 lies (X9-X7)*[W9/(X8-X7)]/(S8/120) spaces from the left. The number of spaces is called N9:

N9 = (X9-X7)*120*W9/(S8*(X8-X7))

Since spaces and linefeeds occur in whole numbers, it is desirable to round off the differences to the nearest integer:

N9 = INT(ABS(N9) + 0.5)*SGN(N9)

The INTeger function and the 0.5 do the rounding off; the SiGN function keeps negative numbers negative. (North Star BASIC, Version 6, Release 3, has a negative-number bug that causes, e.g., INT(-1.1) to be -2. Thus, we use the ABSolute-value function so that INT never operates on a negative number.) A negative N9 means backspaces.

A slight aesthetic problem sometimes occurs when the point to be printed is exactly one-half space from the present position. If left alone, the above program statements will cause the point to be printed to the right when moving from left to right, and to the left, when moving backwards. To prevent this, we do the following just before rounding off:

IF N9 0 AND (-N9-INT(-N9)) = .5
THEN N9 = N9 + 1

Next, you have to store the position of the print-head. The print-head is said to be H9 spaces from the left edge, so the horizontal position of the head is now:

H9 = N9

Then, we simply tell the printer to make N9 spaces.

When we plot the second point, all we do is move the head by the number of spaces needed to get from the first position H9 to the second one, and save the new coordinate in H9.

It is important to keep track of the rounded-off print-head coordinate,

```
100 REM
110 REM
120 REM
130 REM
140 REM PAPER STARTS IN NORMAL POSITION
150 REM COORDINATES OF POINT=(X9,Y9)
160 REM
170 REM          SAMPLE PROGRAM (LISSAJOUS FIGURES)
180 REM
190 FOR J= 0 TO 63
200 X9=SIN(J*.2)
210 Y9=SIN(J*.3)
220 GOSUB 370
230 NEXT J
240 REM NOW RETURN PRINT HEAD TO UPPER LEFT CORNER
250 X9=X7
260 Y9=Y8
270 C9$="" \REM CAUSES A HARMLESS OUT-OF-BOUNDS MESSAGE
280 GOSUB 670
290 STOP
300 REM                    GRAPHICS SUBROUTINE
310 REM
320 REM USES VARIABLES C9$,F9,H9,I9,J9,K9,L9,N9,S8,S9,V9,W9,
330 REM X7,X8,X9,Y7,Y8,Y9
340 REM
350 REM          INITIALIZATION OF GRAPHICS SUBROUTINE
360 REM
370 C9$="*" \REM THIS IS THE CHARACTER TO BE PRINTED
380 REM IF F9=0 THEN THIS IS THE FIRST POINT
390 IF F9=1 THEN GOTO 670
400 F9=1
410 REM CARRIAGE RETURN
420 I9=13
430 GOSUB 1270
440 W9=8   \REM WIDTH OF GRAPH IN INCHES
450 L9=8   \REM LENGTH OF GRAPH IN INCHES
460 S8=1   \REM HORIZ STEPSIZE IN 1/120" UNITS (MAX=125)
470 S9=1   \REM VERT STEPSIZE IN 1/48" UNITS (MAX=125)
480 X7=-1  \REM MIN VALUE OF X9
490 X8=+1  \REM MAX VALUE OF X9
500 Y7=-1  \REM MIN VALUE OF Y9
510 Y8=+1  \REM MAX VALUE OF Y9
520 REM
530 REM SET HORIZ & VERT STEPSIZE
540 I9=27
550 GOSUB 1270
560 I9=31
570 GOSUB 1270
580 I9=S8+1
590 GOSUB 1270
600 I9=27
610 GOSUB 1270
620 I9=30
630 GOSUB 1270
640 I9=S9+1
650 GOSUB 1270
660 REM
670 REM          MAIN GRAPHICS SOFTWARE
680 REM
690 REM CHECK IF COORDINATES TOO BIG OR TOO SMALL
700 IF X9<X7 THEN X9=X7
710 IF X9>X8 THEN X9=X8
720 IF Y9<Y7 THEN Y9=Y7
730 IF Y9>Y8 THEN Y9=Y8
740 REM
750 REM     HORIZONTAL MOTION
760 REM
770 REM H9=HORIZONTAL POSITION OF PRINT-HEAD
780 REM H9=NO. OF SPACES FROM LEFT (0 INITIALLY)
790 REM N9=NO. OF SPACES THAT PRINT-HEAD MUST MOVE
800 N9=(X9-X7)*120*W9/(S8*(X8-X7))-H9
810 IF N9<0 AND (-N9-INT(-N9))=.5 THEN N9=N9+1
820 REM MAKES HALF-SPACE INTERVALS ROUND OFF TOWARDS RIGHT
830 REM ROUND OFF N9
840 N9=INT(ABS(N9)+.5)*SGN(N9)
850 I9=32
860 REM 32=SPACE
870 IF N9<0 THEN I9=8
880 REM 8=BACKSPACE
```

H9, or the roundoff errors will add up. Failure to do this correctly will cause repeating graphs to fail to repeat precisely. A good test of this is given by the Lissajous figure, discussed below.

Similar expressions tell you how many line-feeds or negative line-feeds are needed on the Y axis, where the 1/120 is replaced by 1/48. The vertical position of the print-head is called V9, and the number of lines down from the top of the plot. It is always negative, consistent with the usual mathematical convention that downwards is negative.

Using The Software

The software shown here has a little program to draw Lissajous figures, which are made by plotting a sine wave of one frequency on the X axis, and a similar wave of a different frequency on the Y axis. These are a familiar sight in laboratories, where two signals are fed into the vertical and horizontal axes of an oscilloscope. When the frequencies are ratios of integers (e.g., 2:3), you get patterns that repeat, which not only look nice, but test the ability of the software to avoid cumulative errors.

The software takes less than 3K of memory. If you use the older (Release 3) North Star BASIC, it will run in 16K of RAM if you omit a few of the longer REMarks. The new Release 4 software takes up more space. If you only have 16K of RAM, Omit all REMarks. Follow their advice on eliminating the trig, log and exp functions, also. (For the standard versions, this means replacing the 92H and 5BH bytes, starting at location 2A06H, by A2H and 58H. There must be no program in RAM, other than DOS and BASIC, when you make this modification.)

Although doing this eliminates trig functions, you can still do Lissajous figures by replacing several of the program statements by the mathematical equivalent:

```
190 FOR K=-1 TO 1 STEP 2
 195 FOR J=-1 TO 1 STEP .01
200 X9=K*2*J*SQRT(1-J*J)
210 Y9=3*J-4*J*J*J
220 GOSUB 370
230 NEXT J
235 NEXT K
```

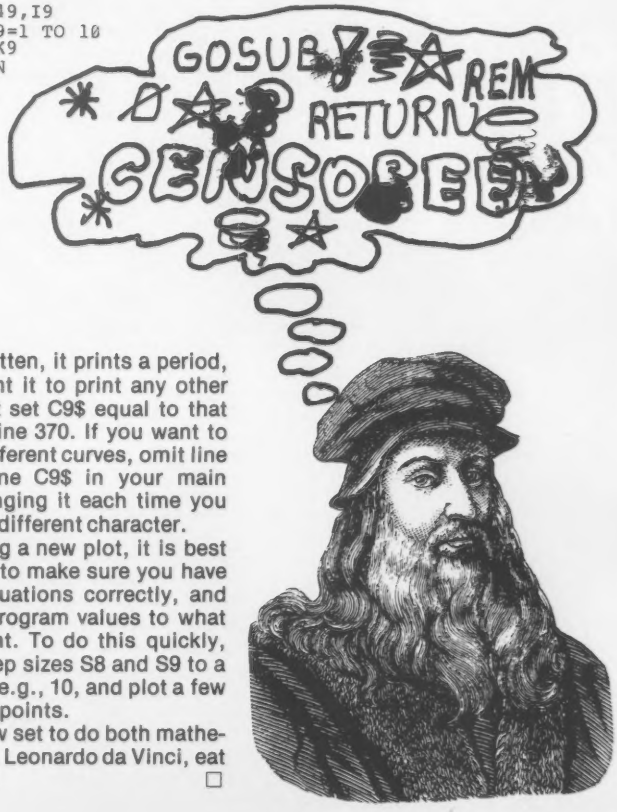
The curve will have the same shape, but the points will be placed differently on it, when done this way. This is because the figure is stepped through in a different (nonlinear) way.

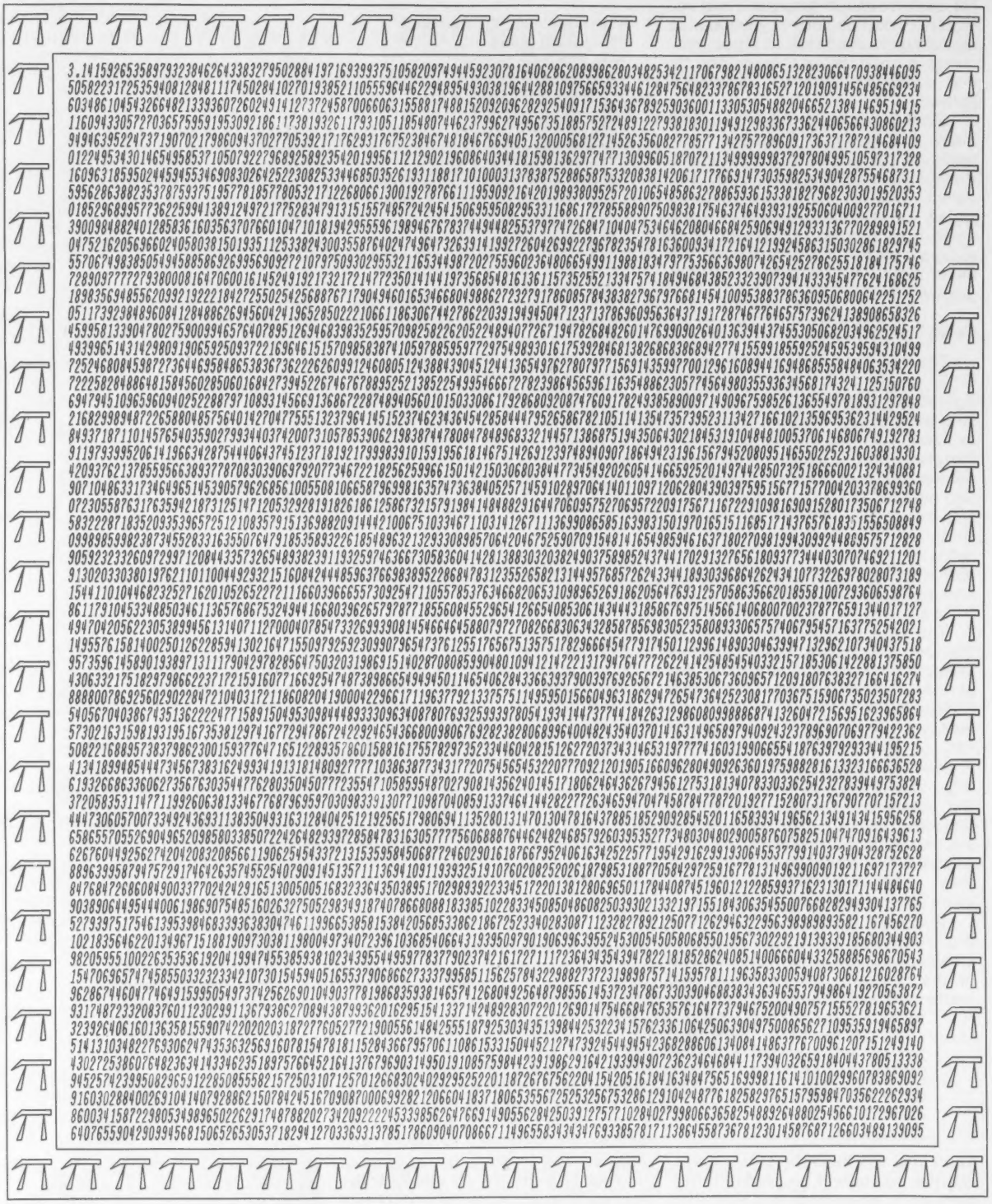
When you have the software loaded, make sure the LOCAL key is off, or the signals will not get to the printer. As written, it prints a period, but if you want it to print any other character, just set C9$ equal to that character, in line 370. If you want to plot several different curves, omit line 370, and define C9$ in your main program, changing it each time you want to print a different character.

When trying a new plot, it is best to experiment to make sure you have written the equations correctly, and have set the program values to what you really want. To do this quickly, just set the step sizes S8 and S9 to a large number, e.g., 10, and plot a few representative points.

You are now set to do both mathematics and art. Leonardo da Vinci, eat your heart out! □

```
890 FOR J9=1 TO ABS(N9)
900 GOSUB 1270
910 NEXT J9
920 H9=H9+N9
930 REM
940 REM      VERTICAL MOTION
950 REM
960 REM V9=VERTICAL POSITION OF PRINT-HEAD
970 REM V9=-(NO. OF LINES FROM TOP)  (0 INITIALLY)
980 REM N9=NO. OF LINES THAT PRINT-HEAD MUST MOVE
990 N9=(Y9-Y8)* 48*L9/(S9*(Y8-Y7))-V9
1000 IF N9<0 AND (-N9-INT(-N9))=.5 THEN N9=N9+1
1010 REM MAKES HALF-LINE INTERVALS ROUND OFF UPWARDS
1020 REM ROUND OFF N9
1030 N9=INT(ABS(N9)+.5)*SGN(N9)
1040 FOR J9=1 TO ABS(N9)
1050 IF N9>0 THEN I9=27
1060 IF N9>0 THEN GOSUB 1270
1070 I9=10
1080 REM 10=LINEFEED
1090 REM 27,10=NEGATIVE LINEFEED
1100 GOSUB 1270
1110 NEXT J9
1120 V9=V9+N9
1130 REM
1140 REM      PRINTING
1150 REM
1160 I9=ASC(C9$)
1170 REM IF DON'T HAVE ASC FUNCTION, USE I9=46
1180 GOSUB 1270
1190 I9=8
1200 GOSUB 1270
1210 REM THIS DOES BACKSPACE WHENEVER A CHARACTER IS PRINTED,
1220 REM WHICH LEAVES PRINT-HEAD AT THAT CHARACTER
1230 RETURN
1240 REM
1250 REM           PRINTER CONTROL SUBROUTINE
1260 REM
1270 OUT 249,I9
1280 FOR K9=1 TO 10
1290 NEXT K9
1300 RETURN
READY
```





Pi to 8182 Places

This design was produced on a Calcomp drum plotter. It was programmed by Steve Rogowski at Suny, Albany, N.Y. A 2-color 23 x 35" poster version of Computer Pi with facts about pi and also how the poster was created is available for $1.75 from Creative Publications, P.O. Box 10328, Palo Alto, CA 94303.

A similar T-Shirt (with pi to 1362 places) in dark brown on tan is available for $5.00. (adult S,M,L,XL) from Creative Computing, P.O. Box 789-M, Morristown, N.J. 07960.

DIABLO PROVES LOOKS ARE EVERYTHING.

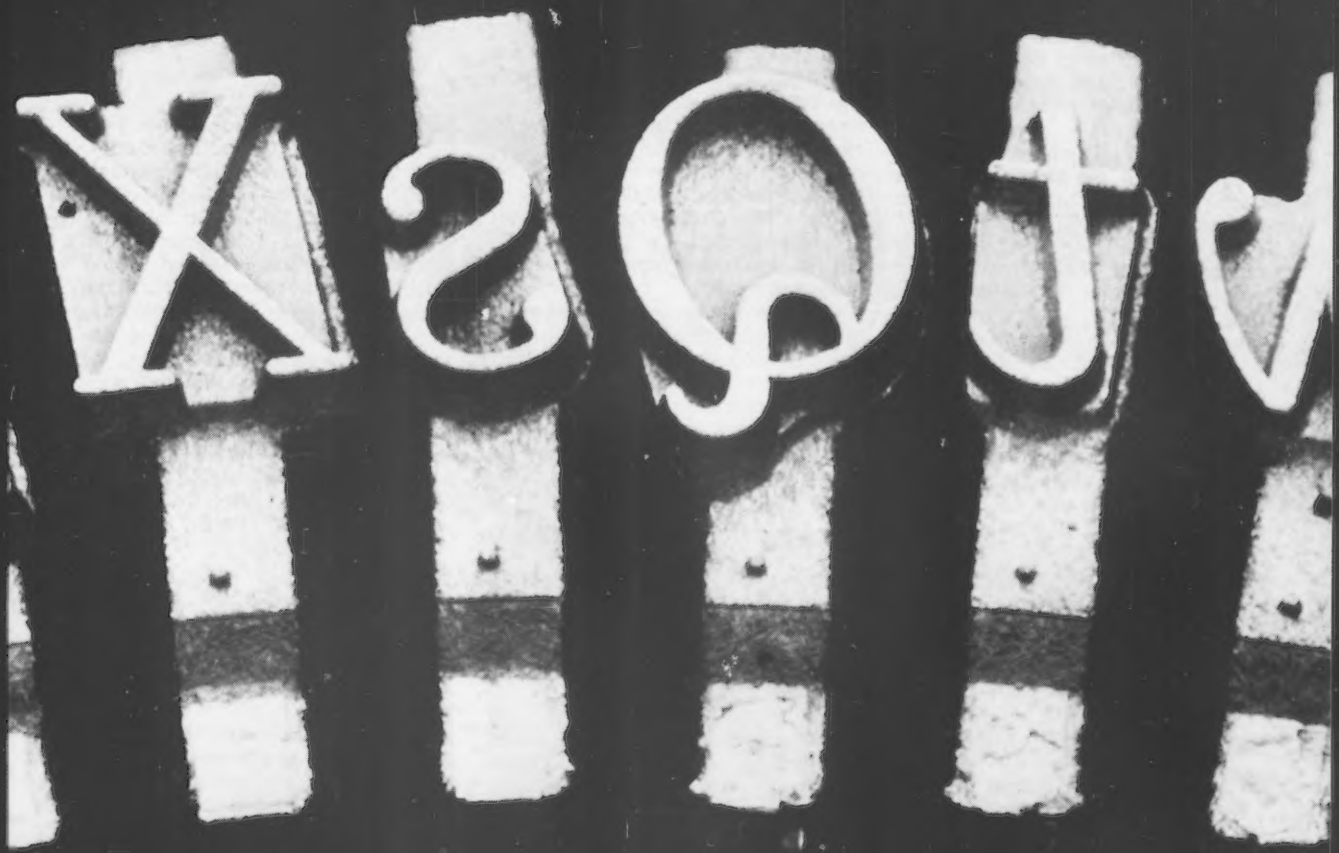
With Diablo's printers and terminals, you can always be sure that beauty will be in the eyes of the beholder. Because no one knows more about print wheel technology than the company that invented it in the first place.

Diablo's metal and plastic wheel printers have established industry standards for crisp, clear characters, proportional spacing, and uniform density.

So, when you're ready to choose a printer for your own computer, pick the one that produces "picture perfect" originals every time.

If you really want to look good, remember this. With Diablo, you'll always look your best.

Diablo Systems



Visit us at Personal Computing Festival booths 16 & 17.

Diablo® is a registered trademark of XEROX CORPORATION.

XEROX

CIRCLE 102 ON READER SERVICE CARD

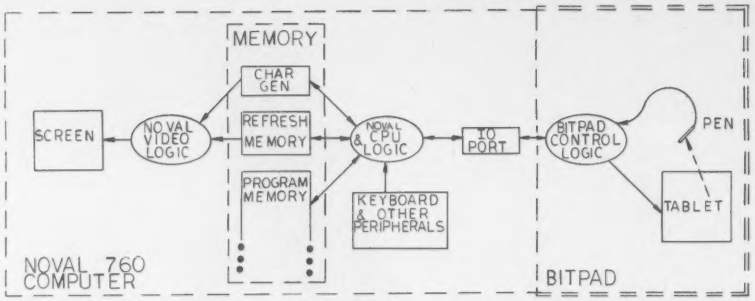
Dramatic Graphics The Bit Pad Way

William J. Blewett

If your system has the ability to plot points, then you can probably use the Bit Pad to draw on the screen. The number of applications is enormous. Your program can do things like automatically connecting two points by a line or a curve. How would you like to design a sailboat or a condominimum, teach your kids to draw, or find paths through computer generated mazes?

In systems with fixed character sets, consider programs where the pen can "latch" onto a character and "tow" it to a different place on the screen. The game of Scrabble is an obvious example or perhaps a game where you build mathematical expressions from a given set of symbols. How about moving furniture around inside the floor plan of a house, or driving a car on an obstacle course?

In systems with programmable character sets, one of the main problems is entering new character images. The Bit Pad found a very practical application automating this process on the NOVAL 760 computer, since this system is heavily utilized for the production of commercial video games. In the NOVAL video system there are a total of 256 characters in the character generator, each of which has an 8 x 8 bit image stored as 8 bytes of memory. Sixty-four of these images (40 - 137 octal) are usually defined as the uppercase ASCII set when communicating with the operating system, however the images of all 256 characters may be re-defined at any time. Originally, character patterns were created by typing in an octal byte for each row of each pattern. To alleviate this time-consuming chore, a program was written which performed the following functions.



1(a) System block diagram.

First, any character or rectangular block of characters can be "blownup" on the screen (displayed in an enlarged form). That is, each dot in a blownup character is represented on the screen by a normal size character, and the cursor is moved around on this enlarged image with the pen. The setting or resetting of individual bits is accomplished by depressing the pen onto the tablet and sequential bits can be set or reset by moving the pen while it is depressed. In addition, many keys on the keyboard are used for flipping, rotating and shifting images, etc. Now it is possible to create the image of a submarine or design an APL character set in minutes instead of hours.

For instance, Photo 2 shows the image of a frog (both normal and inverted) defined in a 4 x 2 block of characters. The upper-left character in the block, containing most of the frog's head, is shown enlarged at the right.

Photo 1. Author William (Bill) Blewett and system.

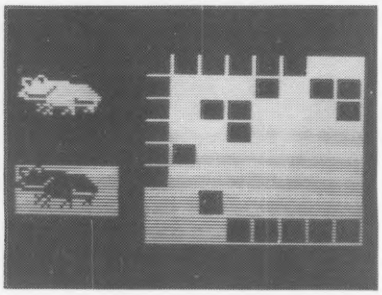


Photo 2. Normal and inverted frog image defined in 8 characters (4 x 2 block). The upper-left character of the upper frog image is shown "blownup" at the right. A cursor character (tracking the Bit Pad pen) moves over the enlarged image, setting or resetting bits when the pen is depressed.

William J. Blewett, Sr. Programmer, Gremlin Industries, Inc., 8401 Aero Dr., San Diego, CA 92123.

Overview

This article describes interfacing a Summagraphics Bit Pad to a Z-80 or 8080 based microcomputer system. In addition, several techniques and applications are discussed for using the Bit Pad in a "characters only" system. The simplicity of doing plotting is briefly mentioned for those whose systems have this capability, and finally, an application is described that allows the drawing of character images in systems with "soft" character generators. A block diagram and photo of the system is shown in Figure 1. The NOVAL 760 is a Z-80 based microcomputer with a character oriented video system and latched I/O ports. The Bit Pad consists of three parts: the pen, the tablet and the control electronics.

Imagine setting up an initial pattern for a LIFE program which you have written. A cursor character is flashing on a blank screen. As the pen is brought near the tablet the cursor jumps suddenly to the corresponding position on the screen and then tracks the motion of the pen as it is moved around. When the pen is touched down, a single Life cell appears where the cursor is flashing. Another touch and it is gone again. Or, of course, the cell can be left there while the pen and cursor move to a new position to deposit more cells. Finally, if the pen is touching the tablet as it moves, a whole line of Life cells will be either

Expand Your Business Four Times This Year

Expanding a business four times in one year may be easier said than done except for your data processing needs. The new MSI Multi-User Computer System is designed to grow with your business by giving you the capability to add up to four user terminals which can be operated simultaneously.

At the heart of the system is the powerful MSI 6800 computer combined with MSI Multi-User BASIC and the new SDOS operating system.

Utilizing the new MSI 16K Static RAM modules expands processor memory to 152K of RAM. Each of the four users commands 32K of processor RAM as well as simultaneous access to the data base.

MSI Multi-User BASIC can be used with any MSI disk memory system including the HD-8/R 10 megabyte and HD-76/R 76 megabyte fixed/removable hard disk systems.

Our new Multi-User Computer System also features a software controllable printer option which allows you to use both a "daisy wheel" word processor for high quality document preparation, and a dot matrix printer for high speed production.

MSI currently offers nine different computer systems for business, industrial, scientific, educational and personal applications. And software to make your data processing more effective includes a Business Accounting Package with accounts receivable, accounts payable, general ledger, and inventory control.

If your business is expanding and you would like to know how an MSI computer system can help you make it more profitable, call or write Midwest Scientific Instruments, 220 W. Cedar, Olathe, Kansas 66061, (913) 764-3273, TWX 910 749 6403 (MSI OLAT), TELEX 42525 (MSI A OLAT)

MSI

Small Computers For Big Jobs

Midwest Scientific Instruments

CIRCLE 170 ON READER SERVICE CARD

Dramatic, con't....

laid down or erased. When the drawing is completed, a touch of a key will activate the production of Life generations.

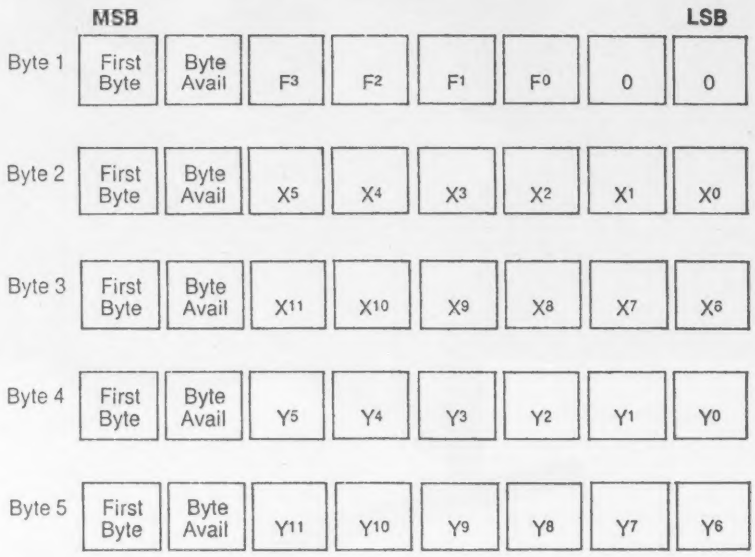
Or consider playing a board game such as Othello. The cursor tracks the movement of the pen until it rests on a chosen square. A touch of the pen to the tablet and your move is made.

Coordinate data and control signals are developed by the Bit Pad and presented to one of the computer's input ports. The Computer reads and interprets this data under the direction of a program stored in its main memory. The results of this are that the CPU makes changes in the two special areas of memory known as the refresh memory and the character generator, which directly influences the display on the screen. In many systems the character generator is in ROM, meaning that the image of each character is fixed, but there are still many interesting applications for the Bit Pad.

Operational Description of Interface

The computer communicates with the Bit Pad by sending it one byte of information containing control signals as shown in Figure 2(a). Next Byte and Byte Received are handshaking flags. Mode 1 and Mode 2 are used to choose one of the three data modes or the diagnostic mode as shown in Figure 2(b). Rates 1, 2 and 4 are used to choose one of the point generation rates as shown in Figure 2(c). Status valid is temporarily set to zero whenever the rate or mode bits are being changed to new values.

The Bit Pad communicates with the computer by sending a stream of 5 bytes as shown in Figure 3. First Byte and Byte Avail are handshaking control signals. F0 reflects the state of the Z-axis switch in the pen or the cursor. F1 to F3 are bits which reflect the state of pushbuttons on the crosshair cursor (which was not used in our application). The XY coordinates themselves are transmitted as the 6 least significant bits in each of the last 4 bytes.



3 Format of the 5 data bytes containing an XY coordinate pair.

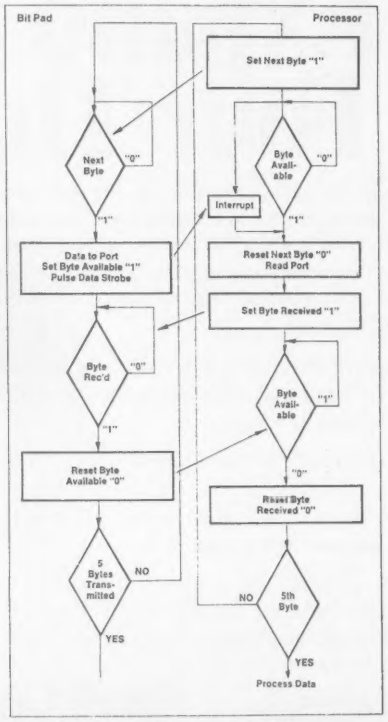
2(a) Format of Command Byte.

MODE SWITCHES		MODE
2	1	
Ø	Ø	Point
1	Ø	Switch Stream
Ø	1	Stream
1	1	Diagnostic

2(c) Truth table for Rate bits.

RATE SWITCHES			COORDINATES PER SECOND
4	2	1	
Ø	Ø	Ø	2ØØ
Ø	Ø	1	15Ø
Ø	1	Ø	75
Ø	1	1	4Ø
1	Ø	Ø	2Ø
1	Ø	1	1Ø
1	1	Ø	5
1	1	1	1

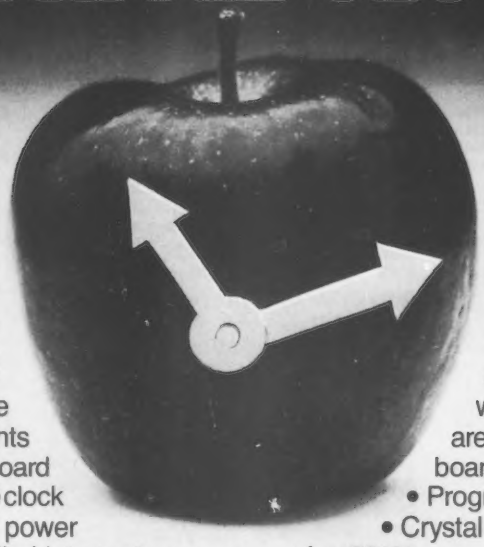
2(b) Truth table for Mode bits.



4(a) Flowchart of the handshaking algorithms for transmitting data bytes.

NEW FROM MOUNTAIN HARDWARE.

THE APPLE CLOCK.



NEW UTILITY FOR YOUR COMPUTER.
Until now, there hasn't been a Real-Time Clock for the Apple II*. The Apple Clock from Mountain Hardware keeps time and date in 1mS increments for over one year. On-board battery backup keeps the clock running in the event of power outage. Software controlled interrupts are generated by the clock. That means you can call up schedules, time events, date printouts ...all in real time on a programmed schedule.

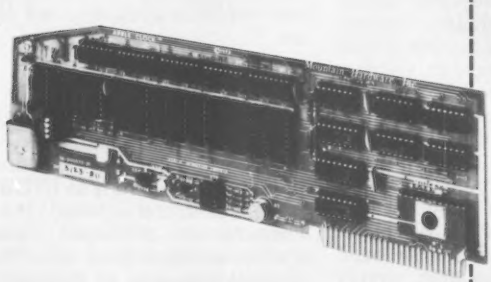
EASY TO USE.
The Apple Clock is easily accessed from BASIC using routines carried in on-board ROM. With it, you can read time and program time-dependent functions for virtually any interval. From milliseconds to days, months or a year.

PLUG IN AND GO.
Plug the Apple Clock into a peripheral slot on your Apple II and you're ready to go.

FEATURES.
- Time and date in 1mS increments for periods as long as one year.
- Software for calendar and clock routines, as well as an event timer are contained on on-board ROM.
- Program interrupts.
- Crystal controlled accuracy of ±.001%.
- On-board battery backup keeps your clock in operation even during power outage.

REAL TIME AT THE RIGHT PRICE.
At $199 assembled and tested, it's the clock your Apple has been waiting for. And, it's available now through your Apple dealer. Drop in for a demonstration. Or return the coupon below.

A COMPLETE LINE.
Mountain Hardware also offers a complete line of peripheral products for many fine computers.



Mountain Hardware, Inc.
300 Harvey West Blvd., Santa Cruz, CA 95060
(408) 429-8600
Sounds great.

_____ Send me everything I'll need to know about the Apple Clock.
_____ I've got a _____ computer. Send me information.

Name_____

Address_____

City_____ State_____ Zip _____

*Apple II is a trademark of Apple Computer, Inc.

CIRCLE 113 ON READER SERVICE CARD

Dramatic, con't....

Software Interface

The software interface consists of a pair of Z-80 assembly language routines for receiving the Bit Pad protocol and extracting the XY coordinate data. This was simple to do as flowcharts of the handshaking algorithms are supplied by Summagraphics in the operating manual. They are shown in Figure 4(a), and the code to implement the computer's side of this process is given in Figure 4(b).

```
;**                          ;READ PORT DATA

;GET A BYTE                  IN A, PADPRT
;                            LD C,A
;DE=DATA TABLE PTR           LD (DE),A
;HL=COMMAND BYTE PTR         INC DE
;
; A=DATA                     ;SET BYTE RECVD
;DATTAB=DATA
;CY=1 IF NO BYTE AVAIL       LD A,(HL)
                             OR 100
GETBYT:                      OUT PADPRT,A
                             LD B,300
;SET NXTBYT

                             ;BYTE STILL AVAIL?
LD A, (HL)
OR 200                       GTBYT3:
OUTPADPRT,A                  IN A,PADPRT
LD B, 300                    AND 100
                             JR Z,GTBYT4
;BYTE AVAIL?                 DJNZ GTBYT3
                             SCF
GTBYT1:                      RET
IN A, PADPRT
AND 100                      ;NO,RESET BYTE RECVD
JR NZ, GTBYT2
DJNZ GTBYT2                  GTBYT4:
SCF                          LD A,(HL)
RET                          OUT PADPRT,A

;YES, RESET NXTBYT           ;PUT DATA IN "A"

GTBYT2:                      LD A,C
LD A,(HL)                    RET
OUT PADPRT,A
```

4(b) Z-80 Assembly language code for implementing the computer's side of the flowchart in Figure 4(a).

The computer enters this routine with DE pointing at a place in memory where it can store the received byte, and HL pointing at an image of the Command byte which it will send to the Bit Pad. It then proceeds as follows:

1. It sets the NEXT BYTE (PLEASE) bit and goes into a loop waiting for the Bit Pad to respond.
2. When the computer reads a high BYTE AVAIL bit it first resets NEXT BYTE and then reads the input port for data, which is stored where DE is pointing. Also DE is then incremented.
3. The computer then sets BYTE RECV'D and goes into a loop waiting for BYTE AVAIL to go to zero.
4. When that happens, BYTE RECV'D is also reset and the routine exits with the data byte in A, as well as in memory.

Note that both of the inner loops are designed so that they will iterate only a finite number of times before exiting the routine with the carry set. This is an error indication meaning that the Bit Pad is not transmitting for some reason; either the pen is not near the tablet, the power is turned off, or something else. Also, the iteration counter should be adjusted to different point generation rates. The values given (300 octal) are for a rate of 200 points per second.

The next higher level routine GETXY (see Figure 5) calls GETBYT repeatedly and synchronizes with each sequence of 5 bytes that contains an XY coordinate pair. It can do this because the first byte of each sequence contains a high FIRST BYTE bit. GETXY sits in a loop reading bytes until this bit goes high.

```
;CALC XY FROM
      5 BYTES                ;CALC XY COORDS
;
;CY=1 IF NO XY DATA          LD HL,(DATTAB+1)
;ELSE                        CALL DPOINT
; X=X COORD                  LD (Y),A
; Y=Y COORD                  ;
GETXY:                       LD HL,(DATTAB+3)
LD DE,DATTAB                 CALL DPOINT
LD HL,COMBYT                 LD(X),A
CALL GETBYT                  AND A
RET C                        RET

;FIRST BYTE?                 ;**

                             ;EXTRACT COORD
AND 200                            BYTE FROM
JR Z,GETXY                   ;TWO DATA BYTES IN HL
LD B,4

;GET 4 MORE BYTES            DPOINT:
                             RL L
GETXY1:                      RL L
                             ADD HL,HL
PUSH BC                      ADD HL,HL
CALL GETBYT                  ADD HL,HL
POP BC                       LD A,H
RET C                        RET
DJNZ GETXY1
```

5 Z-80 Code for synchronizing with the Bit Pad and extracting an XY coordinate pair from a sequence of 5 data bytes. The coordinates are stored at memory locations labelled X and Y.

It then reads the rest of the sequence in a second loop. Finally, the data is converted to XY coordinates. The only tricky thing about this routine is that when FIRST BYTE goes high, the first byte of data has already been read into memory and acknowledged; therefore, the second loop reads only 4 bytes more.

It seems likely that, once synchronized, the computer should never need to test the FIRST BYTE bit again. However, the software needed to do this is messier than simply having GETXY check FIRST BYTE each time. No appreciable processing time is lost and the latter method yields a more reliable piece of code which will re-synchronize itself if anything should go wrong. (Murphy's law: Anything that can go wrong will go wrong.)

The XY coordinate data is extracted from each pair of data bytes by some simple shifting in the DPOINT routine and GETXY stores the results into memory X and Y. Note that the most significant bit and the three least significant bits of each coordinate value are ignored. This is due to the much higher resolution of the Bit Pad (2794 x 2794) than the video system (256 x 224 dots).

Plotting Points

At this point, if one has a PLOT routine which uses dot coordinates, it is possible to draw on the screen by moving the pen, using the simple top-level loop shown in Figure 6.

```
;TOP-LEVEL LOOP               LD A,41
;PLOTTING A LINE              LD (COMBYT),A
                              OUT (BITPAD),A
;COMMAND BYTE IN SCRATCH
COMBYT=0.345                  MAIN:
                              CALL GETXY
;BITPAD PORT                  JR C,MAIN
BITPAD=0                      CALL PLOT
                              JR MAIN
START:
CALL CLEARSCREEN
```

6 Top level loop for plotting a line. The routine PLOT picks up an XY coordinate pair from memory locations X and Y.

PLOT picks up the XY coordinate pair which is stored in memory by GETXY, and turns on the corresponding bit on the screen. Note that the Command Byte of the Bit Pad is initialized to 41, which picks the switch stream mode and sets the rate at 200 points per second.

Some systems, such as the NOVAL 760, do not have independent control over every bit on the screen, but do have programmable character generators. In this case, plotting a dot may be accomplished by displaying a blank character on the screen and turning on a single bit of its image. If a later PLOT call falls into the same character area, another bit of the image is turned on. Unused characters are kept on a free list and plotting can continue until they are all used up.

Moving the Cursor

The routine DOCURS shown in Figure 7 will flash the cursor character once on the screen. It operates quite simply as follows: The current character is saved; the cursor character is displayed; and, the routine enters a delay loop. Then the original character is restored and a second delay loop is entered before the routine finally returns. Note that both delay loops in DOCURS will exit

immediately if a key on the keyboard is pressed. This allows a quick response to commands entered by the user.

```
;**                      ;**

;DO CURSOR               ;CURSOR DELAY:
                         ;EXITS IMMEDIATELY IF KEY
DOCURS:                  ;PUSHED WITH A=ASCII CODE
LD HL,(CURPOS)
LD A,(HL)                CDELAY:
LD (CURCHR),A            LD HL,CURDEL
LD (HL),CURSOR
CALL CDELAY              CDEL1:
                         CALL READCH
;PUT CHAR BACK           RET NZ
                         DEC HL
LD HL,(CURPOS)           LD A,H
LD A,(CURCHR)            OR L
LD (HL),A                JR NZ,CDEL1
CALL CDELAY              RET
RET
```

7 Code to flash a cursor character CURSOR at a given location CURPOS on the screen. Note that the keyboard is scanned during the cursor delay.

All that is now needed to move the cursor is the routine GETPEN shown in Figure 8. It puts the Bit Pad into the STREAM mode and calls GETXY. If a valid set of dot coordinates is read from the Bit Pad, then they are converted first to the coordinates of the character in which the point lies and then to an absolute address in the refresh memory by the routine XYREF. This then becomes the value of CURPOS which is picked up by the DOCURS routine as the location to flash the cursor.

```
GETPEN:                  ;CALC CHAR COORDS FROM
LD HL,COMBYT             ;DOT COORDS, CONVERT TO
LD (HL),MODST            ;ABSOLUTE REFRESH MEMORY
CALL GETXY               ;ADDRESS AND SAVE AS
RET C                    ;CURSOR POSITION.

;SET CURSOR              STCURS:
                         LD HL,(Y)
CALL STCURS              LD A,H
                         RRA
;DOWN OR UP?             RRA
                         RRA
LD A,(DATTAB)            XOR 37
AND 4                    AND 37
RET Z                    LD D,A
                         LD A,L
;PEN IS DOWN             RRA
                         RRA
;PUT FUNCTION             RRA
     CALL HERE           AND 37
;FOR PUTTING A            LD E,A
     CHAR AT             CALL XYREF
;POSITION OF CURSO       LD (CURPOS),HL
                         RET
RET

;**
```

8 Routine to get an XY coordinate pair from the Bit Pad, set the cursor at a corresponding place on the screen, and execute an arbitrary function if the pen is depressed.

Finally, GETPEN looks to see if the pen is touching the tablet. This is accomplished by checking the FO flag bit for each point to determine the pen position. It is at this point that the user can insert a call to a subroutine which will display a Life cell or make an Othello move (etc.) at the position of the cursor.

The two routines, GETPEN and DOCURS, are called alternately from the top level control loop shown in Figure 9. If a key is pressed while DOCURS is scanning the keyboard, then its ASCII value is passed to the routine COMAND in the A register (else A = 0) for processing. A sample COMAND routine is given but XYREF is not shown since the code is completely dependent on the system on which you are working.

Drawing a More Accurate Line

A useful technique for improving the accuracy of tracking a pen in many applications involves subdividing each region that the pen enters into an active and an inactive area. The program then ignores all XY coordinates originating from inactive areas.

For instance, defining a figure as a rectangular area on the surface of the tablet is equivalent to subdividing the area into small squares, each of which represents a dot (or perhaps a whole character) on the screen. As the pen moves through each square the corresponding dot is either turned on or off (or possibly ignored) on the screen. Due to the inaccuracy of drawing by hand, this can lead to a loss of resolution as the pen moves accidentally into nearby dots.

```
;TOP-LEVEL LOOP           ;MAIN LOOP
;MOVING A CURSOR

                         MAIN:
;BITPAD PORT              CALL GETPEN
PADPRT=0                 CALL DOCURS
                         CALL COMAND
;ASCII VALUE OF CURSOR    JR MAIN
CURSOR=101

                         ;**
;DELAY COUNT
                         ;DECODE COMMAND
CURDEL=40                      KEYS

;BITPAD STREAM MODE       ;
MODST=21                 ; A=ASCII VALUE
                               OF KEY
;SCRATCH BYTES
DATTAB=0.345    ;5 BYTES COMAND:
CURPOS=5.345    ;2       AND A
CURCHR=7.345    ;1       RET Z
COMBYT=10.345   ;1       CP "A"
     Y=11.345   ;1       JR Z,AROUTINE
     X=12.345   ;1       CP "B"
                         JR Z, BROUTINE
;**                      CP "C"
                         JR Z,CROUTINE
;START PROGRAM
                         ;INSERT MORE
                           COMMANDS HERE
START:
CALL CLEARSCREEN
LD DE,0.0
CALL XYREF
LD (CURPOS),HL
LD A,MODST
LD (COMBYT),A
OUT (PADPRT),A
```

9 Top level loop for tracking the pen with a cursor and executing a function when the pen is depressed, as well as executing other functions if keys on the keyboard are pushed. Incidentally, these can alter the function which gets executed when the pen is depressed.

EXTRAORDINARY VALUE !!

Distributors Of Quality Computer Terminals, Accessories, & Supplies

"SMART" CRT TERMINAL

$995. ($53/month rental)

INFOTON 100 Video Terminals Now IN STOCK!

Get the following STANDARD features at our "Dumb" price.

Z-80 microprocessor design, 24X80 format, x-y addressing, cursor read command, block/character modes, insert/delete line, dual intensity, limited graphics capability, printer interface, switch selectable baud rates from 110 to 19,200 bps, EIA/Current Loop interfaces, etc.

Emulates LSI ADM 3A, Hazeltine 1400/1500, DEC VT-52, ADDS 520, P-E Fox.

CONTACT US TODAY TO PLACE YOUR ORDER OR TO OBTAIN MORE INFORMATION!

Terminal Sales & Development, Inc.

30 COMMERCE STREET SPRINGFIELD, NEW JERSEY 07081

(201) 376-8980

CLIP THIS COUPON TO SAVE $$$

Dramatic, con't....

This is particularly noticeable when drawing a diagonal line as the slightest deviation will activate squares whose corners touch the diagonal, for instance, squares A and B in Figure 10(a). The problem may be solved by ignoring all XY pairs that originate near the edge of an area.

This filtering operation is performed by the routine called MARGIN, Figure 10(b), which is called once for each coordinate in a pair. Register E contains the width or height of the square area and L contains the offset of the pen into the square. MARGIN determines the relation and returns with the carry set

$$\left(\frac{E}{8}\right) < L < \left(\frac{7E}{8}\right)$$

set if the relation is not true. If both coordinates pass the test than the point lies in the active area.

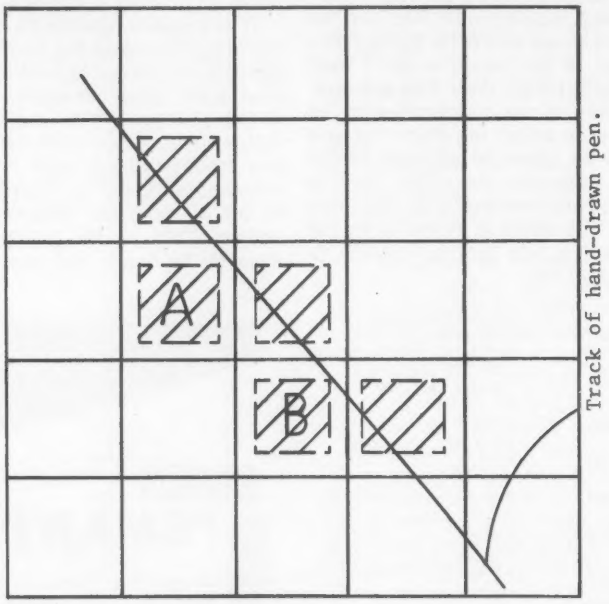
The choice of making the margin size one-eighth the width of a square was empirically chosen as it yielded better results than one-fourth or one-sixteenth. Of course, other ratios or even non-square active areas may also be used, but the above is satisfactory.

Conclusions

The Bit Pad is, in my experience, an excellent piece of hardware. It was easy to interface, both in hardware and software, and it has performed reliably from the moment it was first turned on. I should mention that a second I/O port may be necessary if you wish to use the RS232 or TTL compatible serial lines, the interrupt control signal or the remote reset line. For our application, none of these were necessary.

Acknowledgements

I would like to thank Mr. Terry Sorensen for several suggestions concerning the software. I would also like to thank Mr. Alex McKay who, upon receipt of the Bit Pad, rapidly assembled a power supply and wired the connecting cable which transmits data and control signals between the Bit Pad and the computer's latched I/O port. □



10(a) Drawing a more accurate line. Note that although the pen moves through the corners of squares A and B, it does not enter the active inner square areas (shaded). Therefore, these bits or characters are not turned on on the screen, and the result is a more accurately drawn diagonal line as is desired.

```
;**                             RRCA
                                AND 37
;PEN NEAR MARGIN OF DOT?        CP L
;                               CCF
; E=WIDTH OF SQUARE             RET C
; L=OFFSET INTO SQUARE          SUB E
;                               NEG
;CY=0 IF (E/8)<L<(7E/8)         CP L
                                RET

MARGIN:
LD A,E                          ;**
RRCA
RRCA
```

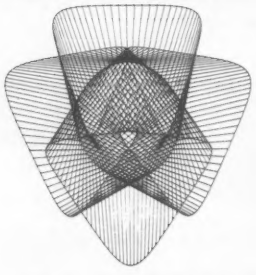
(b) Code to determine if a coordinate lies in the active or inactive region of a square.

The Bit Pad is available from Summagraphics, 35-Brentwood Ave., Box 781, Fairfield, CT 06430.

Editor's Note:

Summagraphics states in their advertisements that they will pay $1,000 to any author who writes an article describing an application for the BIT PAD and gets it published. They don't mess around about it, either. The acceptance letter for this article was mailed on January 29th. Bill sent a copy of that, along with a copy of the article, to Summagraphics...and had a check for $1,000 in his hands on February 12th! - John.

VisiCalc™
How did you ever do without it?
CIRCLE 192 ON READER SERVICE CARD



The First Computer Design Coloring Book

by "Design Enterprise". 84 intricate patterns for creative people of all ages.

Size 10" x 8". Paperbound $4.95, now at your bookstore, or send check to Crown Publishers, One Park Ave., N.Y., N.Y. 10016. N.Y. and N.J. residents, add sales tax.

H·A·R·M·O·N·Y B·O·O·K·S

CIRCLE 139 ON READER SERVICE CARD

PLACE ORDERS TOLL FREE

800/421-5809 Continental U.S.
800/262-1710 Inside California

LEEDEX MONITOR

- 12" Black and White
- 12MHZ Bandwidth
- Handsome Plastic Case

$139.00

THE KIM 1

$179

KIM-1 Module monitor, programs stored in 2048 ROM Bytes, User Manual, Wall size schematic, Hardware manual, Programming manual, Programmers reference card, and Keyboard display.

CASES — $29.95

THE SYM-1 $245

6502 — based single board computer with keyboard/display, KIM-1 hardware compatible, complete documentation.

SYM—1 CASE $39.95

MICROPROCESSORS		
F8		$16.95
Z80 (2MHz)		$20.00
Z80A (4MHz)		$14.95
CDP1802CD		$17.95
6502		$11.95
6800		$16.95
6802		$25.00
8008-1		$12.95
8035		$20.00
8035-8		$21.00
8080A		$10.00
8085		$23.00
TMS9900TL		$49.95
8080A SUPPORT DEVICES		
8212		$ 2.90
8214		$ 4.65
8216		$ 2.75
8224 (2MHz)		$ 4.30
8224-4 (4MHz)		$ 9.95
8226		$ 2.75
8228		$ 6.40
8238		$ 6.40
8243		$ 8.00
8251		$ 7.50
8253		$20.00
8255		$ 6.45
8257		$20.00
8259		$20.00
8275		$75.00
8279		$18.50
USRT		
S2350		$10.95
UARTS		
AY5-1013A		$ 5.25
AY5-1014A		$ 8.25
TR1602B		$ 5.25
TMS6011		$ 5.95
IM6403		$ 9.00
BAUD RATE GENERATORS		
MC14411		$10.00
14411 Crystal		$ 4.95
6800 PRODUCT		
6810P		$ 4.00
6820P		$ 6.60
6821P		$ 6.60
6828P		$11.25
6834P		$16.95
6850P		$ 8.65
6852P		$11.00
6860P		$ 9.25
6862P		$12.00
6871P		$28.75
6875P		$ 8.75
6880P		$ 2.50
CHARACTER GENERATORS		
2513 Upper (-12+5)		$ 6.75
2513 Lower (-12+5)		$ 6.75
2513 Upper (5 volt)		$ 9.75
2513 Lower (5 volt)		$10.95
MCM6571 up scan		$10.95
MCM6571A down scn		$10.95
PROMS		
1702A		$5.00
2708		$ 9.95
2716 (5+12) TI		$60.00
2716 (5v) INTEL		$60.00
2758 (5v)		$30.00
DYNAMIC RAMS		
416D/4116 (200ns)		$12.50
2104/4096		$ 4.00
2107B-4		$ 3.95
TMS4027/4096 (300ns)		$ 4.00
STATIC RAMS	1—15	16—100
21L02 (450ns)	$ 1.50	$ 1.20
21L02 (250ns)	$ 1.75	$ 1.50
2101-1	$ 2.95	$ 2.60
2111-1	$ 3.25	$ 3.00
2112-1	$ 2.95	$ 2.65
FLOPPY DISK CONTROLLERS		
1771B01		$39.95
1791		$49.95
KEYBOARD CHIPS		
AY5-2376		$13.75
AY5-3600		$13.75
MM5740		$18.00

JADE'S *DOUBLE DENSITY Controller Board*

KIT: $249.00
Assmb. & Tstd: $299.00

- Single or Double Density Recording
- Full Size or Mini Floppy
- CP/M Compatable in either density
- Programmed Data Transfer, no DMA
- Controls up to 8 drives
- IBM format in either density
- Software Selectable Density

■ This controler utilizes the proven reliability of the IBM standard format as well as the lastest phase-locked-loop for data seperation. ■ All clocks are generated from an on-board cyrstal oscillator ■ Right precompensation is used to enhanced data recovery reliability in the double density mode ■ Density selection is enitirely transparent to the user ■ Single and double density diskettes can be mixed on the same system.

NEW!

JADE Z80 BOARD

IMPROVED DESIGN AND FEATURES

- ON BOARD 2708 or 2716 EPROM
- VERY RELIABLE AT 4 MHZ OR 2 MHZ
- POWER ON JUMP AND RESET
- ON BOARD USART (8251)

2MHz	
Kit	$135.00
Assembled & Tested	$185.00
4 MHz	
Kit	$149.95
Assembled & Tested	$199.95
Bare Board	$ 35.00

JADE 8080A

with full documentation

Kit	$100.00
Assembled & Tested	$149.95
Bare Board	$ 30.00

EPROM BOARD KITS

JG8/16 (uses 2708 or 2716) $69.95

APPLE•TRS-80•APPLE•TRS-80•APPLE•TRS-80

Jade Memory Expansion Kits for TRS-80 and Apple!

4116's

Everything a person needs to add 16K of memory. Chips come neatly packaged with easy to follow directions. In minutes your machine is ready for games and more advanced software.

$82.00

"IMSAI"-TYPE CARD GUIDE SPECIAL:

Regular Price 30¢ each

SPECIAL: 10 for $1.00!

Rockwell AIM-65: The Head-Start in Microcomputers

A KIM-1 compatible machine with on-board printer and a real keyboard!

$375.00 w/1K RAM
$450.00 w/4K RAM

4K assembler/editor in ROM:	$ 80.00
8K BASIC in ROM:	$100.00
Power supply:	$ 59.95
Case for AIM-65:	$ 49.95

Special Package Price: $599.00
AIM-65 (4K), Power Supply, Case, and 8K BASIC ROM

New Prices

DYNAMIC RAM BOARDS EXPANDABLE TO 64K

32K VERSION • KITS

Uses 4115 (8K×1, 250ns) Dynamic RAM's, can be expanded in 8K increments up to 32K:

8K	$159.00	24K	$249.00
16K	$199.00	32K	$299.00

4115 SALE 8 for $39.95

64K VERSION • KITS

Uses 4116 (16K×1, 200ns) Dynamic RAM's, can be expanded in 16K increments up to 64K:

16K	$249.00	48K	$469.00
32K	$369.00	64K	$569.00

DYNABYTE *Naked Terminal*

$350.00

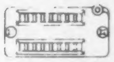
FEATURES & BENEFITS

■ 80 character by 24 line format (Model 57) ■ Completely self contained terminal electronics, just add CCTV monitor and key board ■ No support software required ■ Switch selectable modes: Half Duplex, Full Duplex, Block mode ■ Block mode allows for editing before transmit ■ Keyboard interface provided ■ Fully assembled, socketed, tested, burned in, and guaranteed for a full year from date of purchase ■ Video is switch selectable "Black-on-White" or "White-on-Black"

S-100 EDGE CONNECTORS

Soldertail $3.25 each
10 for $35.00
Wire Wrap $4.00 each
10 for $40.00

TEXTOOL ZIP* DIP® II Sockets



***ZERO INSERTION FORCE sockets**

PRICES:

16 pin Zip Dip II	$5.50
24 pin Zip Dip II	$7.50
40 pin Zip Dip II	$10.25

★ STATIC RAM SPECIALS ★

2114's, low power (1024x4)

	1-15	16-99	100 +
450ns	8.00	6.95	5.50
300ns	9.00	8.00	6.50

TMS4044/MM5257, low power

450ns	8.00	7.50	6.50
300ns	9.95	8.75	8.00

4200A (4K×1, 200ns)

9.95	8.50	8.00

410D (4K × 1, 200 ns)

8.25	7.00	6.75

STATIC RAM BOARDS

JADE 8K

Kits:	450ns	$125.95
	250ns	$149.75
Assembled & Tested:	450ns	$139.75
	250ns	$169.75
Bare Board:		$ 25.00

16K — Uses 2114's (low power)
Assembled & Tested:

RAM 16 (250ns)	$375.00
RAM 16B (450ns)	$325.00

16K with memory management
Assembled & Tested:

RAM 65 (250ns)	$390.00
RAM 65B (450ns)	$350.00

32K Static
Assembled & Tested:

250ns	$795.00
450ns	$725.00
250ns Kit	$575.00

JADE Computer Products

4901 W. ROSECRANS AVENUE
Department "F" 3
HAWTHORNE, CALIFORNIA 90250
U.S.A.

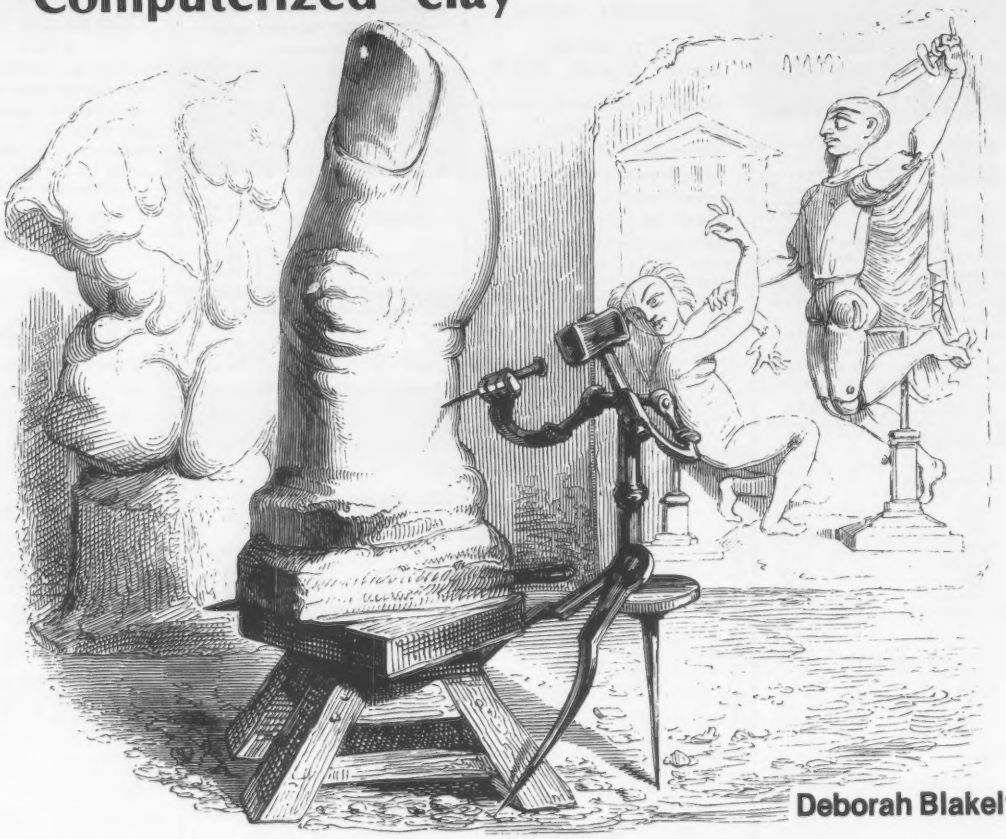
Telephone:
(213) 679-3313
(800) 421-5809 Continental U.S.
(800) 262-1710 Inside California

Cash, checks, money orders, and credit cards accepted. Add freight charge of $2.50 for orders under 10 lbs. and $1.00 service charge for orders under $10.00. Add 6% sales tax on all parts delivered in California. Discounts available at OEM quantities.

WRITE FOR OUR FREE CATALOG
All prices subject to change without notice.

CIRCLE 156 ON READER SERVICE CARD

New Tool For The Sculptor
Computerized "clay"



Deborah Blakely

In most computer art, the artist uses the computer to create an actual work of art. But Ray Jacobson, a sculptor at Carleton College in Northfield, Minnesota, has put the computer to a different use. Jacobson used the computer as a tool to produce the raw material to create ten large two-dimensional "sculptures."

His work also differs in another way from most computer art. Instead of starting with a computer program as most computer artists do, Jacobson started with six miniature sculptures he cast in bronze, and then used the computer to extend them on a flat surface so that he could look at sculpture in a two-dimensional rather than a three-dimensional plane.

Sound impossible? Not according to the complex method Jacobson developed to "translate" his three-dimensional bronzes onto paper and canvas.

Deborah Blakely, Carlton College, Northfield, MN 55057.

"You can look at sculpture from many different angles," he explains. Jacobson teaches studio art courses in sculpture at Carleton College, where he is chairman of the art department. "I used the computer as an aid to more perceptibly read sculpture in the traditional manner, namely as a multi-silhouette phenomena, and then convert that reading to a two-dimensional surface."

"I used the computer as an aid to more perceptibly read sculpture in the traditional manner, namely as a multi-silhouette phenomena, and then convert that reading to a two-dimensional surface."

Jacobson's objective was to explore form and shape in sculpture in a new way, in an attempt to expand his sculpture vocabulary. His sculpture images are a direct expression of that quest, and they are derived directly from the original bronze sculptures, via the computer. It was a process involving many steps.

After Jacobson made the small bronze sculptures he had them photographed from several different angles (see Photo 1). He then made simplified drawings from the photographs, recording the contours as well as the dark and light areas of the photographs.

With the help of two students from Carleton College, he then transferred these simplified drawings onto a specially-made grid and coded the shapes according to their gray, black and white values (1 = white, 2 = gray, 3 = black).

The next step involved writing a computer program whereby Jacobson's shapes could be stretched, shrunk, expanded, juxtaposed, etc., on a computer screen. David Neiman of Newington, Connecticut, (a Carleton student) wrote the computer program, using Tetronix plotting images and a Tetronic 4006 terminal connected to a DEC PDP-11-70 RSTS/E computer system.

"There was an erosion effect going on," Jacobson explains. "Just as natural forces wash and shape a rock with water, sand or wind, and give shape to the world around us, I was nursing these forms, orchestrating the shape of the computer images.

Working closely with Jacobson, Andy Luebker of Stillwater, Minnesota, now a Carleton sophomore, projected images on the computer screen based on information from the coded grid. They started out with simpler black and white shapes and then moved on to more complicated shapes with more complex tonal ranges, shrinking, expanding, juxtaposing and combining the images on varying backgrounds (see Photo 2). Jacobson spent many hours with Luebker at the computer terminal, providing the artistic direction while Luebker handled the technical manipulation of the computer. They made 100 workable, unique images reflecting the characteristics of the three-dimensional bronzes on a flat surface.

Jacobson then selected five of these images printed by the computer and had them photographically enlarged. The result was five large and graphic two-dimensional "sculptures" such as in Photo 3. These large sculptures dramatize the computer language itself and the shape qualities derived from the small scale bronzes. Jacobson then went a step further. Still using the computer generated images as his raw material, he painted five large acrylics on canvas (shown in Photo 4) which he also calls two-dimensional sculpture.

Both the large computer images and the acrylics are tinged with technology, Jacobson says, "another worldly creation in which the human hand has had only indirect influence." In fact, none of these pieces were shaped exclusively by the human hand. Throughout the project, Jacobson allowed chance and randomness to contribute to the development of his sculptures. When creating the bronzes, for example, Jacobson allowed his carved wax molds to "erode" in a molten wax solution before he cast them. Also, the computer was programmed to provide random and chance elements to emerge while the artist plotted designs on the screen.

"There was an erosion effect going on," Jacobson explains. "Just as natural forces wash and shape a rock with water, sand or wind, and give shape to the world around us, I was nursing these forms, orchestrating the shape of the computer images. These works represent a combination of natural forces and technology."

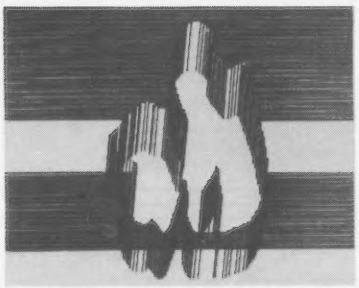
Jacobson's artistic effort culminated in an exhibit that included not only the six bronzes and ten two-dimensional "sculptures," but also a printout of the computer program, samples of the photographs of the bronzes from different angles, the contour drawings and coded grid of these photographs, and 60 of the 8"x10" computer images.

From bronze, to computer image to acrylic, the exhibit is a testimony to the compatibility of art and technology, and to the computer's capability to be a useful tool to the artist.

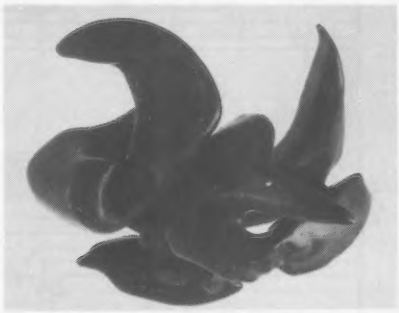
From bronze, to computer image to acrylic, the exhibit is a testimony to the compatibility of art and technology, and to the computer's capability to be a useful tool to the artist.

Ray Jacobson has taught at Carleton College since 1955. His works have been exhibited extensively in public and in private galleries and have won many awards. He has executed numerous sculpture commissions, most recently a sculpture/fountain for the Minnesota Valley County Library in Mankato, Minnesota. □

Large-scale computer-generated image.

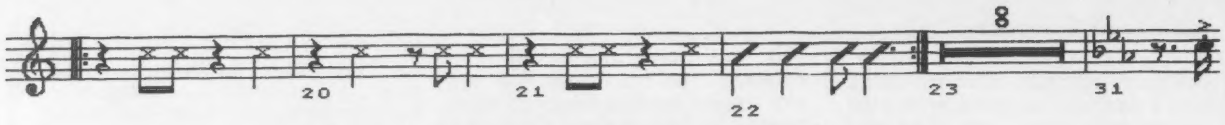


Computer-generated image by Ray Jacobson.

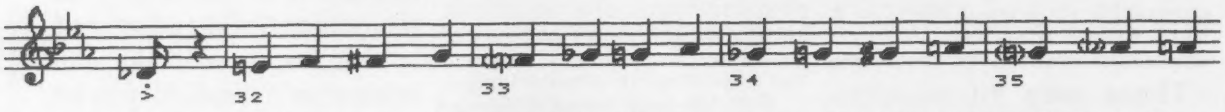


Bronze sculpture by Ray Jacobson.

Acrylic on canvas by Ray Jacobson.



The Music Men and Their Incredible Printing Machine



John Craig

Line printers can do lots more than print lines of text. Here's one creative application from the field of music.

Did you know that most of the music submitted by popular artists to sheet music typesetters and printers is only in the form of a recording? That's right, there's rarely any written music, or even rough notes, accompanying the recording. The copyist, as he or she is called, plays the tape of the session back and transcribes the music note by note for each instrument!

Photo 1: Laddie Chapman and his music development system.

I've just described what Laddie Chapman does for a living. You can appreciate the musical background he must have in order to do the transcriptions accurately. Laddie's finished product is beautiful handwritten sheet music which looks as finished as printed music. He transcribes well. But he didn't need someone to hit him over the head to make him realize there was a better way to do it! He and a friend, Elliott Myron, have teamed up to develop a music typesetting/printing system that will make a lot of composers, arrangers, copyists and performers very happy!

Laddie and Elliott have put together an impressive combination of hardware and software to make up their music composition system. They developed a special character set for a Merlin video board which provides for the display of all musical symbols on the monitor screen during the composition or transcribing of music (see Photo 2). They went on to develop a musical character set for the Malibu printer (Photo 3) and it generates their finished product. You have to look closely at the finished manuscript to determine that the music was generated by a dot-matrix printer! It's the best example I've seen so far of what the Malibu is capable of doing with its software character generation. There are not many other printers on the market capable of handling such a task.

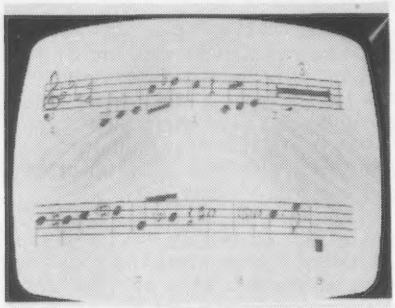


Photo 2: The monitor display of music symbols generated via the Merlin video board.

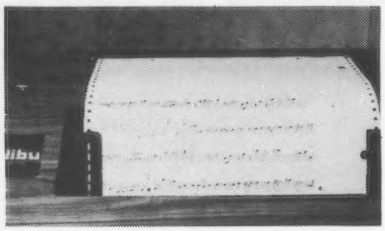
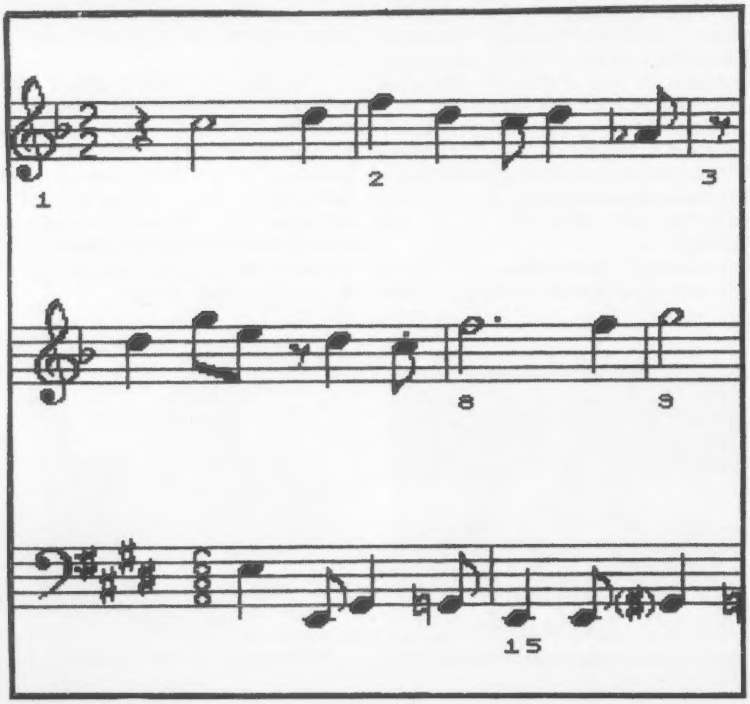
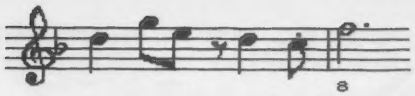


Photo 3: The finished sheet music coming out of the Malibu Model 160 printer. (Malibu Design Group, 8900 Eton Ave., Suite G, Canoga Park, CA 91304.)



Sample of Malibu printout.



The system has a customized keyboard which allows for entry of musical symbols, a music synthesizer for playing back the music once it's entered and software which checks for missing beats, bars and other functions. One of the objectives in the system design was to make it easy to use with a minimum of training. Another was to make it faster and less expensive than anything similar to it on the market. (Actually, I don't think there is anything like this on the market!)

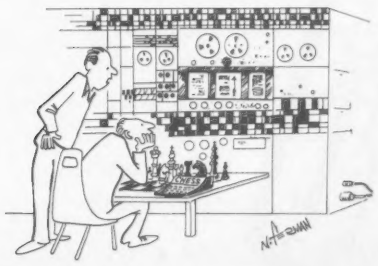
Speaking of the market...the system isn't ready for it at this time. The designers feel that it will probably be one to two years before the entire system is finished. They plan to approach the development in three stages:

1. System One will be a monophonic system only and since its use will be limited they don't plan on a production model.

2. System Two will write polyphonic music and divise parts for all common instruments. It will be able to write vocal music and lead sheets with chord symbols. This will be their first production model.

3. System Three will include all of the above features but will use a faster microprocessor and improve video display with higher resolution (besides, Merlin has gone out of business). The printing quality will "equal the finest engraving and surpass the music typewriter."

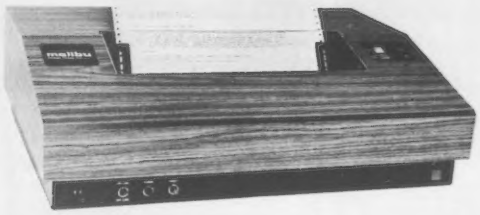
The list of features in this system is extremely long and their number, along with the complexity of implementing all of them, accounts for the length of time it will take to develop the system. If your interest has been aroused, then drop Laddie and Elliott a line at Chateau-Klump Music Systems, P.O. Box 973, No. Hollywood, CA 91603. □



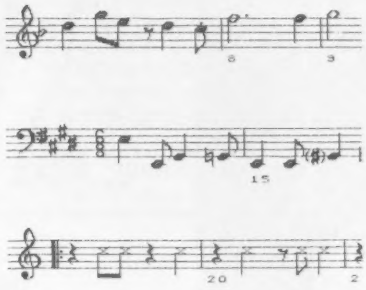
"Don't let it intimidate you!"

©Creative Computing

Graphics Unlimited . . .



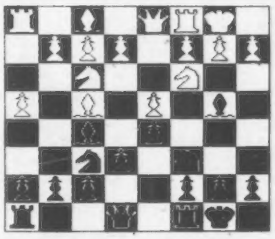
Malibu dot matrix impact printers can deliver graphics and more. Whichever model you choose, graphics capability is a standard feature along with high speed smart printing at 165 characters per second. And the new model 165 also offers word processing quality with an alternate, reduced speed, high density character set.



DOT CONTROL: That's the name of the game for graphics. Whether your interest is Beethoven, the challenge of chess, or plotting daily sales figures, a Malibu printer will allow your graphics images to be realized.

Each dot can be independently addressed under software control, with resolution to 8280 dots per square inch.

Your imagination is the only limit.



Get graphic!

Call or write today for complete specifications on the Malibu printers and sample printouts of the graphics in this ad.

Dealer inquiries invited.

malibu Design Group, Inc. (213) 998-7694

8900 Eton Avenue Suite G, Canoga Park, CA 91304

CIRCLE 148 ON READER SERVICE CARD

THE USS ENTERPRISE

The USS Enterprise

Howard Wilczynski

The story behind my version of the USS Enterprise. It started 3½ years ago when at a Star Trek Convention. A friend and I spotted a computerized Enterprise (just an outline and not a very good one) selling for $1.00. My friend said to me, "You're a computer scientist, let's see if you can do a better job." It took me 7 months, putting in only a couple of hours a week because of school and my job, but I finally finished it and ran it at UCLA. Within a few days copies of it were floating around all over the place because I made the mistake of putting the data set on a public disk pack and telling someone about it.

In July 1976, I started working at JPL. I brought in a copy of my Enterprise and hung it over my desk. Within a few days I got so many requests for copies that I brought in the deck. At JPL I work in the Image Processing Laboratory (IPL) and, after some advice, decided to convert the line printer graphic into an image.

As you can see there are some rough lines in both pictures that I have not got around to fixing and probably never will because no one really seems to mind. Some of the well-known people that have copies include: Gene Roddenberry, and George Takai.

Howard Wilczynski, Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91103.

MUSE™

THE LEADER IN QUALITY HOME SOFTWARE

announces new APPLE-II software

DR. MEMORY (32k) Disk Word Processor **$49.95** includes UPPER and lower case plus complete printer controls. Variable page size, left and right margins, automatic paragraphing and more. On diskette with documentation.

APPILOT EDU-DISK (32k) $49.95 A complete multi-program C.A.I. system for the **APPLE II.** Includes program editor and **APPILOT** interpretor on diskette with extensive on-line HELP lessons plus documental manual.

MICRO INFORMATION SYSTEM (32k) $99.95 is a breakthrough in effective information systems of any size. This one system handles accounts payable/receivable, inventories, appointment calenders, cost estimating, real estate listings, sales solicitations, manpower accounting, selective mailings and label printing, dietary information, phone directories and more! On diskette.

SUPER-LOAD Cassettes

U-DRAW (16k) $17.99 - Hi resolution graphics editor.
ELECTRIC CRAYON (8k) $17.95 - Full color graphics editor.
MUSIC BOX (8k) $12.95 - three octave sound includes sharps, flats, note time, rests and tempo.
TANK WAR (16k) $12.95 - hi-res 2 player action.
MAZE GAME (16k) $12.95 - best 3-D color maze game.
SIDE SHOWS (8k) $12.95 - six colorful games in BASIC.
ESCAPE! (16k) $12.95 - a challenging 3-D adventure.

Available from dealers or write today to the
MUSE CO., 7112 Darlington Drive, Baltimore, MD 21234
Order by phone (301) 661-8531 MASTERCHARGE and VISA welcome

CIRCLE 198 ON READER SERVICE CARD

NEW TRS-80 LEVEL II 16K NEW

THE STOCK EXCHANGE

A real-time stock market simulation game .... A stimulating venture into stock trading for one or two investors... Watch the market trend, keep an eye on the changing stock prices and look for news on the news ticker .... Go to your portfolio, place your buy/sell orders .... Make (or lose) a bundle ..... Fascinating ..... Outright habit-forming $15.95

SEND ORDERS TO:

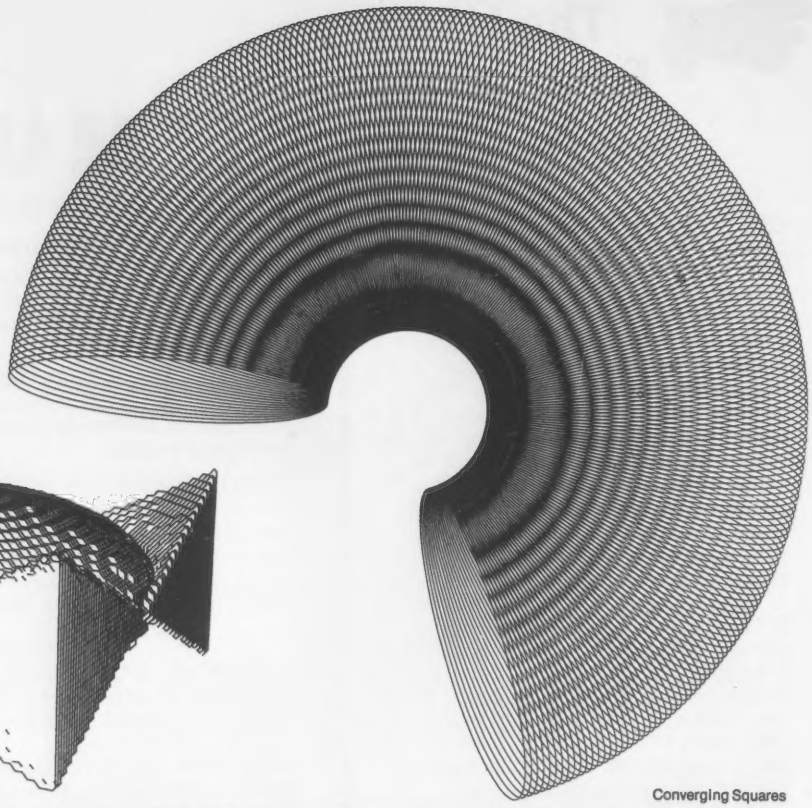
©1979 MICRO-FANTASTIC PROGRAMMING

P.O. BOX 2307 GRAND CENTRAL STATION NEW YORK, N.Y 10017

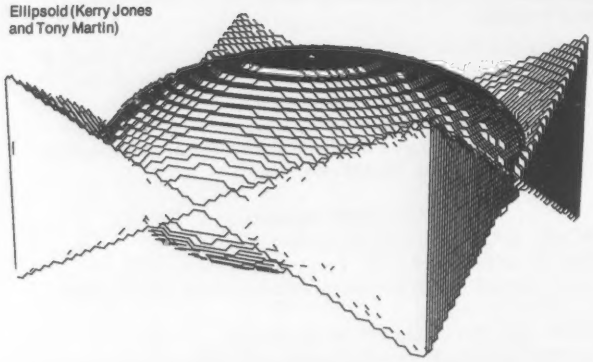
CIRCLE 165 ON READER SERVICE CARD

GRAPHICS BY KERRY JONES

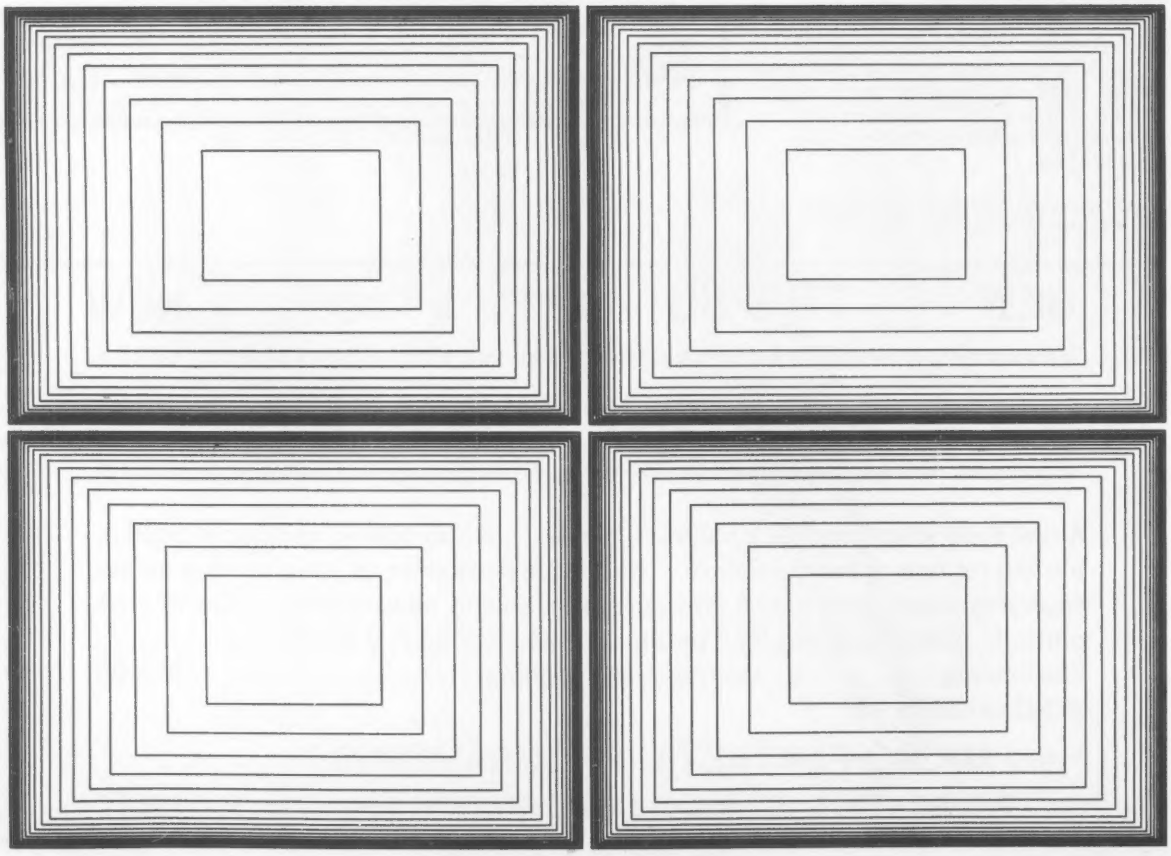
These unusual plotter graphics were created by Kerry Jones, Route 4, Box 2131, Eufaula, Alabama 36027. They were done on a large mainframe with a 22 x 30" flat bed plotter, but there's no reason that similar graphics couldn't be done on more modest systems.



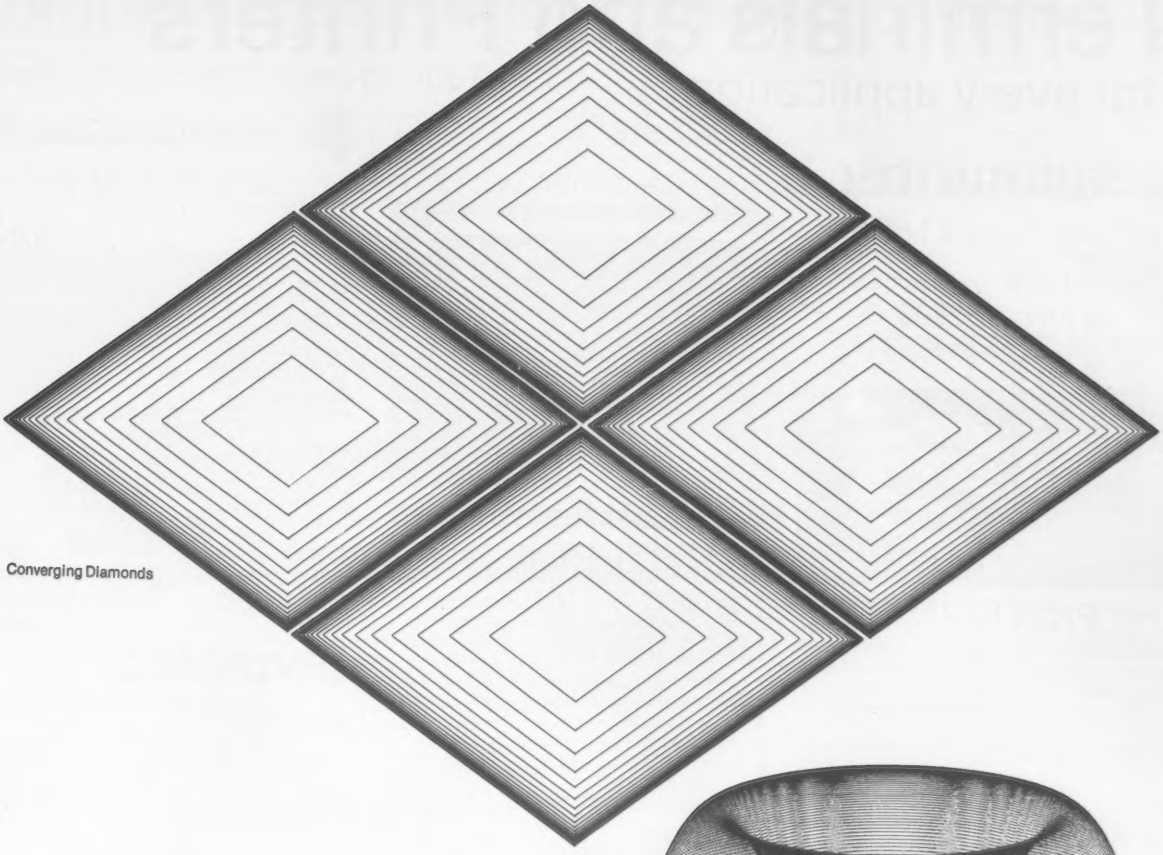
Torus



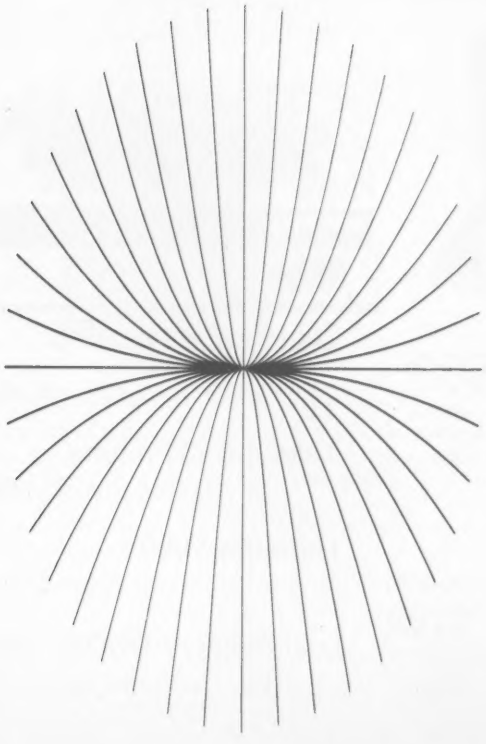
Ellipsoid (Kerry Jones and Tony Martin)



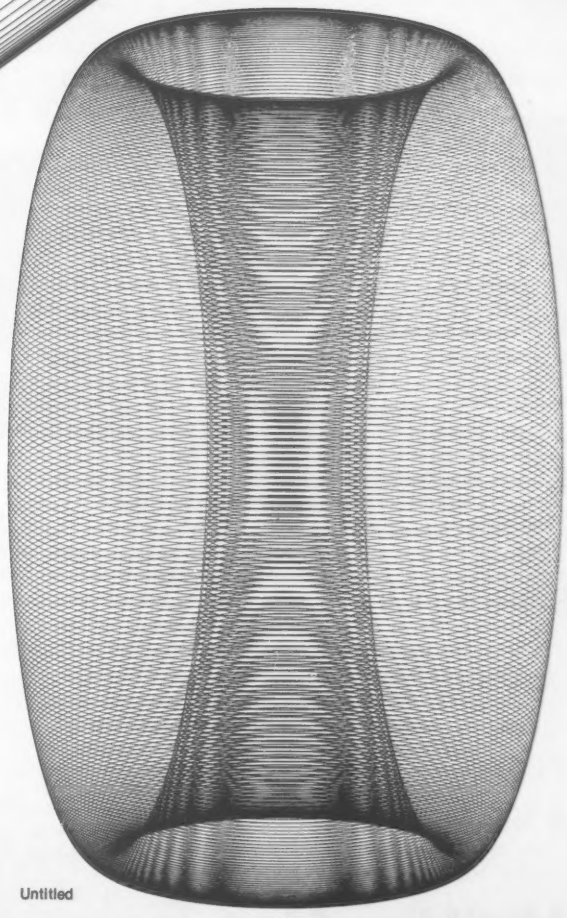
Converging Squares



Converging Diamonds



Elliptical Parabolas



Untitled

Terminals and Printers
for every application . . .

NEC **spinwriter**™

RO's as low as **$1695**

KSR Terminal (55 cps, RS232C) as low as **$2595**

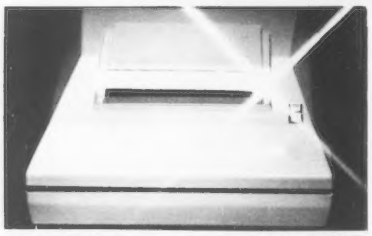
— Letter Quality at 55 cps —

THE PRINTERM 879

Unbelievable speed at low price — 120 cps, printing in upper and lower case with a 9 x 7 dot matrix in a bi-directional mode. Microprocessor-controlled RS232 or optional parallel interface directly compatible with TRS-80 or Cromemco System 2 or 3. Friction or pin-feed models available. Friction-feed model can use standard Teletype roll.

Friction Feed Model, List $1395 **$1099**

Pin-Feed Model, List $1495 **$1199**



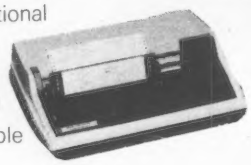
T.I. 810 as low as $1695

Bi-directional

165 cps

Logic-Seeking

Adjustable Tractor



SOROC 120

NEW LOW PRICE

$795

INTERTUBE II by Intertec

- 12" Display
- 24 x 80 format
- 18-key numeric keypad
- 128 upper/lower case ASCII characters
- Reverse video, blinking
- Complete cursor addressing and control
- Special user-defined control function keys
- Protected and unprotected fields
- Line insert/delete and character insert/delete editing
- Eleven special line drawing symbols

List $995

OUR PRICE $784 Limited Time Only!

BANTAM 550

from PERKIN ELMER

Small in size, light in weight, and low in price — but on top of the list in features and performance.

- Upper and lower case
- Full 24 x 80 format
- Sharp 7 x 10 dot matrix

Get everything you want without paying for things you don't need — List: $996

NOW FROM US AT **$799**

Add $20 for anti-glare screen

Integral Data Systems, Inc.

IP-125 with 1210 Option*

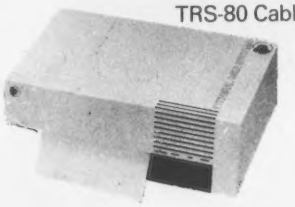
List $838 OUR PRICE **$754**

IP-225 with Tractor, 1210 and 1250 options

List $984 **$889**

*1210 Option is expanded and compressed print

TRS-80 Cable — $49



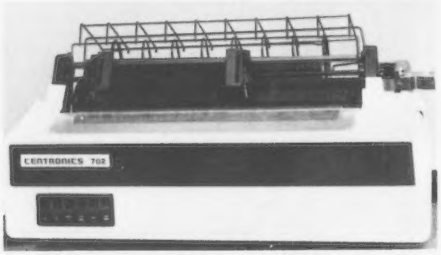
CENTRONICS

779 (60 cps — same as TRS-80 printer) OUR PRICE ONLY **$979**

979 with Tractor **$1039**

702 (120 cps, bi-directional) **$1895**

703 (185 cps, bi-directional) **$2189**



OTHER VALUES . . .

DECwriter II **$1490**

Teletype 43 Printers as low as **$880**

Hazeltine 1500 our price **$1049**

Lear Siegler ADM3A **$849**

SHIPPING, HANDLING and INSURANCE: Intertube, Bantam 550, Printerm, IP-125/225, Teletype 43's, Hazeltine 1500, and ADM3A can be shipped by UPS. Heavier printers — air or truck, freight collect.

All prices subject to change and all offers subject to withdrawal without notice.

WRITE FOR FREE CATALOG

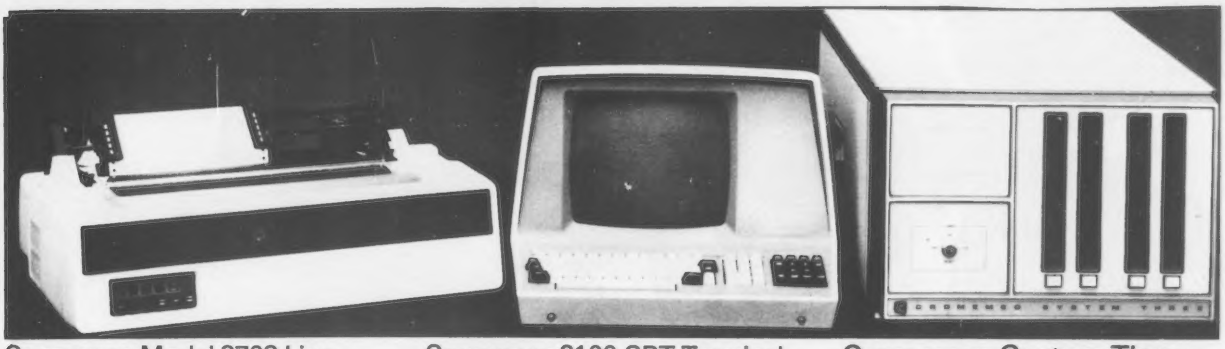
MiniMicroMart, Inc.

1618 James St., Syracuse, NY 13203 (315) 422-4467 TWX 710 541-0431

Complete systems for your applications . . .

Priced to fit your NEEDS and BUDGET!

We can supply a DEC PDP-11 . . . Data General Micro Nova . . . or one of the leading S-100 systems (Business applications programs available)!



Cromemco Model 3703 Line Printer 180 cps, 132 cols, 18" platen, bi-directional printing, List $2995
OUR PRICE **$2545**

Model 3779 Line Printer 60 cps, 12" 12" platen, List $1495 OUR PRICE **$1270**

Cromemco Disk Software – BASIC, Fortran, Assembler, Cobol, Word Processing System, Data Base Management – all complete with the new CDOS disk operating system, CP/M® COMPATIBLE, List $95 each.
MiniMicroMart Price only **$85 each**

Multiple User Basic, List $800 **$680**

Cromemco 3100 CRT Terminal 80 char/line, 24 lines, 19,200 baud, upper and lower case, List OUR PRICE **$1356**

3101 CRT Terminal 80 char/line, 24 lines, upper/lower case, List $1995 **$1695**

MiniMicroMart can supply a business applications program written in Cromemco BASIC; and since the latest Cromemco CDOS (Disk Operating System) is now fully CP/m compatible, you can now run any program written in other languages as well, such as C-BASIC and any Microsoft or Xitan software.

Cromemco System Three

List $5990 OUR PRICE **$4990**

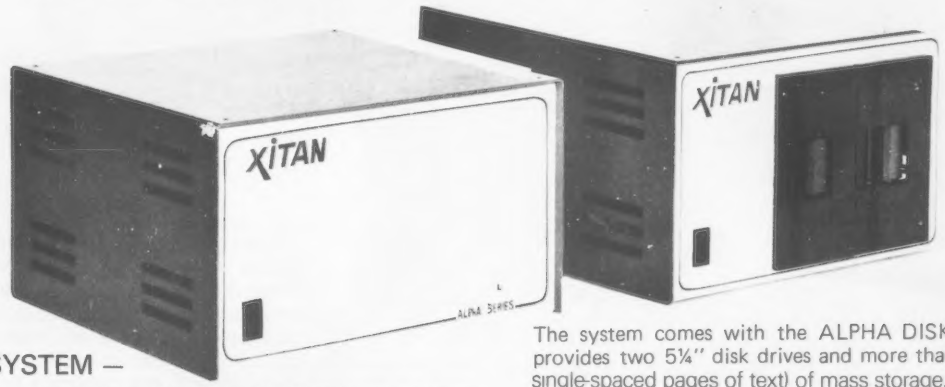
Features 4mhz CPU, 32K of RAM, dual PerSci floppy disk drive (and provision for installing two more drives), RS232C Interface, printer interface. Assembled and tested, ready to use.

SYSTEM TWO, List $3990 **ONLY $3390**

BONUS BUY

Add only **$495** – and get a full 64K Cromemco System Two or Three!

ALPHA 5 mainframe only, with 32K RAM, SMB-II Board.
List $1939
OUR PRICE
$1589



ALPHA DISK SYSTEM
WITH SOFTWARE
List $2195
OUR PRICE
$1795

XITAN SYSTEM –

Go with one of our Xitan Alpha modular business systems. We give you a Perkin-Elmer Bantam 550 Terminal, a Printerm 879 120-char. cps pin-feed printer, a Xitan Alpha S-100 mainframe with Z-80 CPU, 32K of RAM, and an SMB-II System Monitor Board which provides the Zapple Monitor in firmware ROM and two serial RS232 ports.

The Disk System is supplied with a complete software package, which includes Xitan's new, exclusive ELDOS Disk Operating System, which is CP/M compatible. You also get the full Xitan A3-Plus Software Package, which includes their Extended Disk BASIC, Macro-Assembler, Z-TEL Text Editor, Text Output Processor, LINKER, and Z-BUG. (A complete commercial-caliber business application package, written in Xitan BASIC is available at extra cost.)

COMPLETE SYSTEM with Terminal and Printer Our Price **$4990**

The system comes with the ALPHA DISK SYSTEM which provides two 5¼" disk drives and more than 630K (160 full, single-spaced pages of text) of mass storage. Utilizing the new Dual Density Disk Controller, the system may be expanded up to a total of eight drives (two additional minis and four full size). This flexibility allows for future system expansion.

Systems from MiniMicroMart are not limited to those shown. Custom versions of Cromemco, North Star, Vector Graphic, Xitan, and others are available. Call or write for a system to meet your specific requirements.

All prices subject to change and offers subject to withdrawal without notice. Prices are f.o.b. shipping point.

— IMMEDIATE DELIVERY ON CROMEMCO & XITAN SYSTEMS —

— WRITE FOR FREE CATALOG —

MiniMicroMart, Inc.

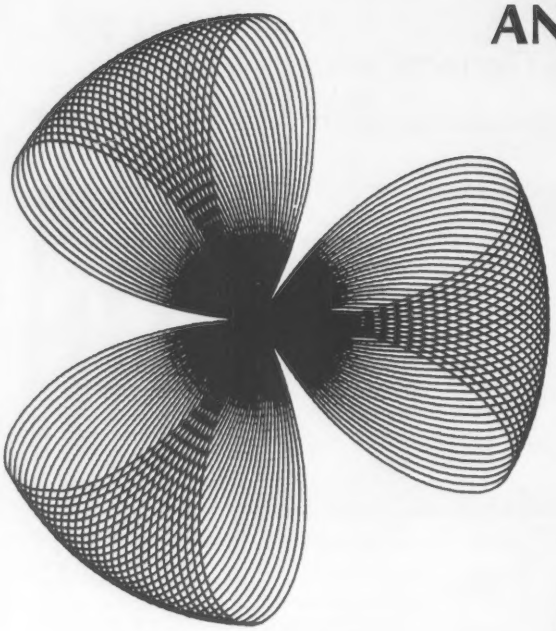
1618 James St., Syracuse NY 13203

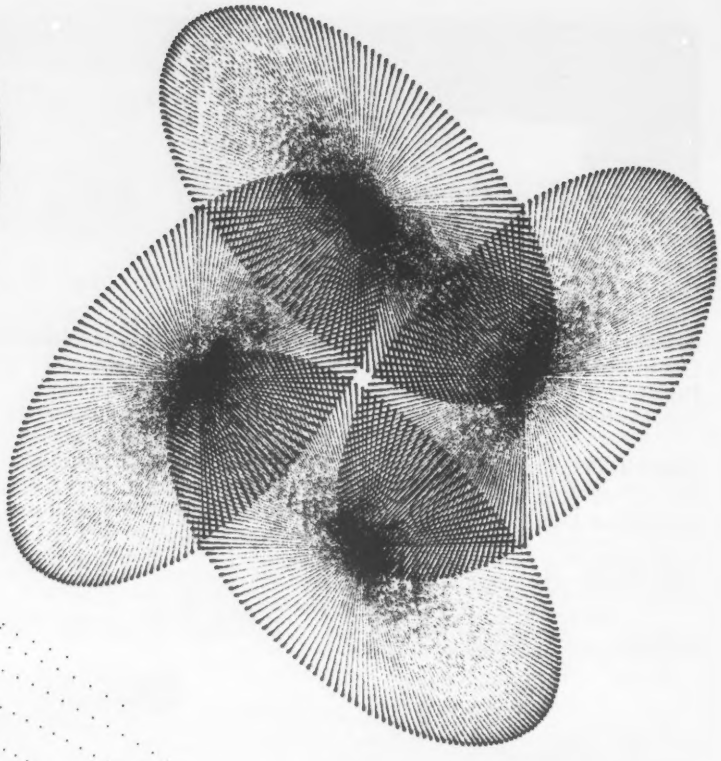
TWX 710-541-0431 (315) 422-4467

CIRCLE 171 ON READER SERVICE CARD

CIRCLES, SPIRALS, AND POLYGONS

Rick Dickerson

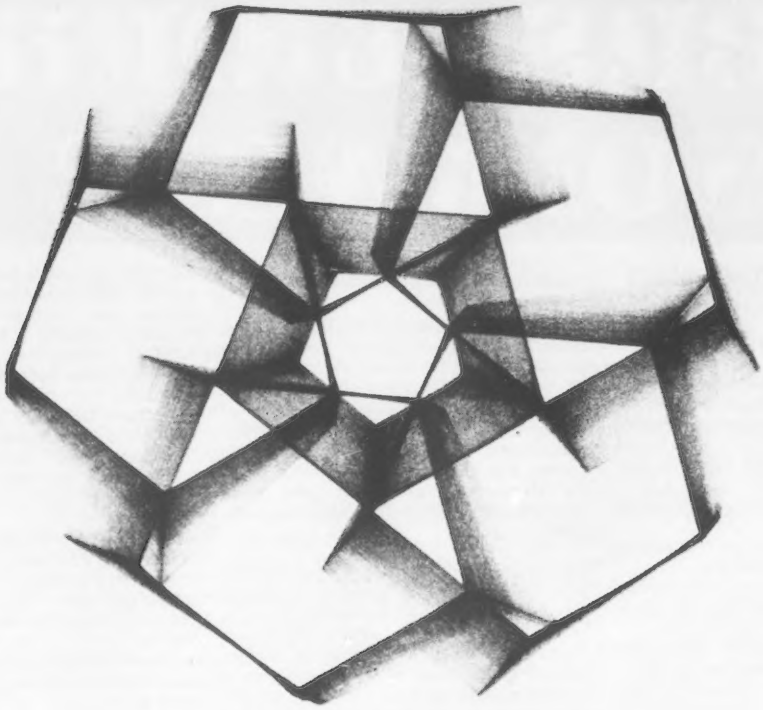


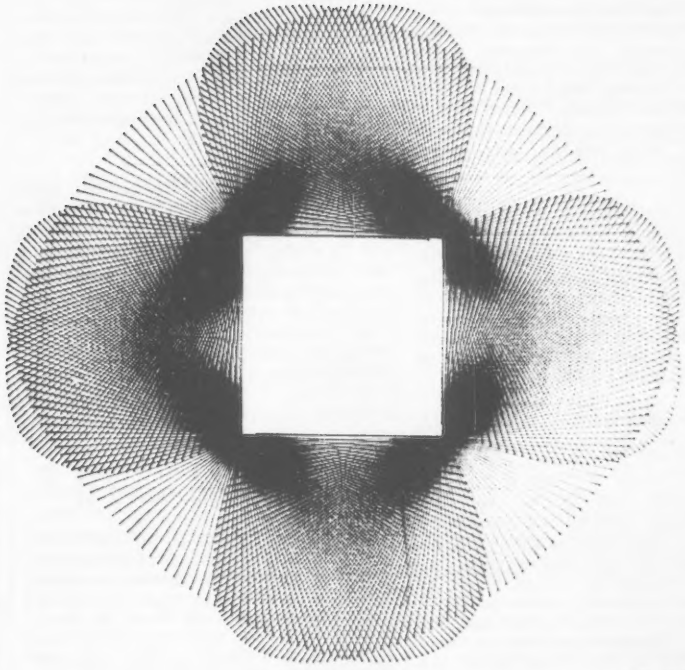


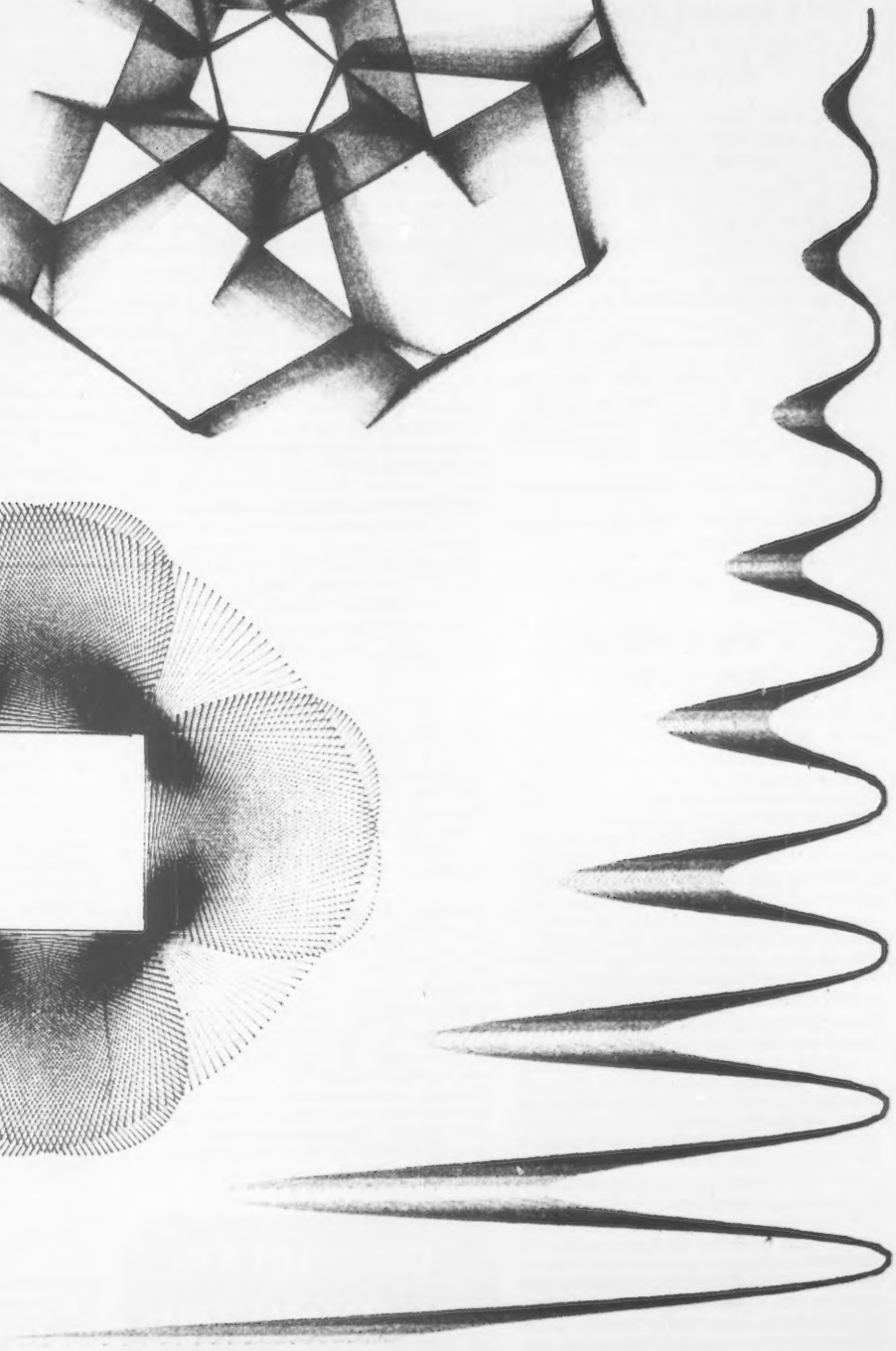
The graphics on these pages were drawn on a Hewlett Packard 7202A Graphic Plotter operated by two Hewlett Packard 2100A computers, one used for I/O access and the second used as a central processor.

Although the program I use to create my pictures is written in HP BASIC, it uses no statements that cannot be converted to common BASIC. CIRCLE, the name of this program, is a graphics interpreter which uses its own artistic language. The language centers around two statements. One, the polygon statement, creates an N-gon inscribed in a circle. The other, the points statement, allows the user to specify points, thus allowing for more complicated figures. Other statements can rotate, move, expand or contract the drawing.

Rick Dickerson, Talge Hall, Southern Missionary College, Collegedale, TN 37315.







sensational software

Why should you select Creative Computing Software?

1. Highest quality programs—outstanding applications for education, recreation, business, and household management.
2. Best value—up to *ten* different programs per tape.
3. Reliability—programs thoroughly tested and de-bugged.
4. Redundant recording– *two* copies of every program on each tape.
5. Professional quality tape—high density oxide, 100% calendered, flat frequency response, low noise, high output.
6. Anti-jam cassette—teflon lubricated six-rib gasket, hard welded windows, double locking self lubricating hub, double flanged rollers on stainless steel pins, heavy metal shield.
7. Hard plastic box—best protection, easy to file.
8. Widely available—carried by most retail computer stores.
9. Made in U.S.A.
10. Inexpensive—best value per dollar of *any* software.

A Word About Tape Quality

All video tape, most computer tape, and some good cassette tape is calendered. Calendering is what gives tape the smooth, glossy appearance on the oxide side. (Compare a Maxell UD tape to a poly pack tape and you'll see the difference.)

As you know, if your tape heads are dirty, you lose frequency response. A rough tape surface causes virtually the same effect as dirty heads. It prevents intimate tape head contact with the main body of the tape. When tape is coated, it has millions of microscopic peaks and valleys. Calendering eliminates the peaks and valleys, causing a very smooth surface. In addition, since there are no rough peaks, there is less oxide ruboff and less head wear.

Calendering is just one of the many high quality features you'll find in Creative Computing Software cassettes. We could have purchased cassettes for half the price that would have worked, but we wanted to be sure that our cassettes would last for years and would give you an error-free program load *every* time.

Rather than rush our software to market, we've paid attention to tape quality, the cassette mechanism (it *won't* jam), redundant recording, and packaging (hard plastic box) as well as the programs themselves. With Creative Computing Software, you can be sure you're getting the absolute best that money can buy.

PET (8K) Software

CS-1001. Logic Games-1. Six favorites from *BASIC Computer Games* with super graphics. **Awari,** the African logic game with 12 pits and 36 beans. **Bagels,** which challenges you to guess a secret 3-digit number. Martin Gardner's **Chomp** in which you chomp on a cookie with a poison corner. **Flip-Flop**—change a row of X's to O's. **Hexapawn** played with three chess pawns. **Hi-Q,** a solitaire peg-removal game. $7.95.

CS-1002. Number Games-1. Six number logic games including **Guess** in which you guess a secret number. **23-Matches**—try not to take the last match. **Letter** in which you guess a secret letter. **Number,** a random jackpot game. **Trap** in which you trap a mystery number between two trap numbers. **Stars** gives you stars as clues to the secret number. $7.95.

CS-1201. Sensational Simulations-1. Five super simulations including the popular **Animal** in which the computer learns animals from you. **Fur Trader** lets you trade furs in old Canada. **Hammurabi** in which you manage the city-state of Sumeria. Or try making your fortune in the **Stock Market.** A logic game, **Word,** has you guess secret words. $7.95.

CS-1003. Logic Games-2. Six challenging puzzles including **Rotate,** in which you order a matrix of random letters. **Strike-9,** try to remove all nine digits without striking out. The classic number game, **NIM.** In **Even-Wins** try to take an even number of chips. **Hi-Lo,** a number guessing game with a jackpot. **Batnum,** the super "battle of numbers!" $7.95.

CS-1004. Graphics Games-1. Five amazing realtime graphics games designed especially for your PET. In **Chase,** one player pursues the other through a maze of obstacles and "zap doors." **Escape**—attempt to escape from a prison patrolled by robot guards. **Dart** provides arithmetic drill and indicates how close your response is to the correct answer on a dart board. In **Snoopy** you compute distances on a number-line while trying to shoot down the Red Baron. In **Sweep** you must try to hit nine targets in order by controlling the path of a cannonball. $7.95.

CS-1005. Graphics Games-2. Six favorite games. **LEM,** lunar lander with a graphic display and optional auto-pilot. **Nuclear Reaction,** a game of skill for two players. **Artillery,** in which two players shoot it out over computer-generated terrain. **Bounce** traces the path of a ball bouncing around the screen. **Checkers,** with graphic display, from our *BASIC Games* book. **Dodgem,** try to outmaneuver another player or the computer to get your pieces across the board first. $7.95.

CS-1006. Conversational Games-1. Talk to **ELIZA,** the computerized psychoanalysis program. Compose poetry with **Haiku.** Challenge your vocabulary and word-guessing skills with **Hangman. Hurkle,** try to find the hurkle on the 10 by 10 grid in five moves. In **Hexletter,** you compete to capture more letters on a hexagon than your opponent. $7.95.

CS-1007. Board Games (7 Games). Yahtzee — classic 5-dice game. Win or lose your fortune in **Blackjack.** The classic game of **Backgammon.** Defeat the Klingons with your phasers and photon torpedoes in **TREK3. One Check** — solitaire game to leave one checker on a board. **Bug** — graphic demo zaps bug. **Revenge of the Bug** — graphics demo. $7.95.

CS-1008. Action Games (6 games). Splat is a parchute jump game. In **Car Race** zoom around the course. **Breakout** lets you try your luck at knocking bricks off the wall. How about a day at the lanes with **Bowling?** In **Subs** you try to sink enemy subs while evading enemy torpedoes. Fight it out against another player on a variety of battlefields in **Tanks.** $7.95. (Available July)

OSI Challenger 1P and Superboard II

CS-6001. Graphic Games-3 (4 Games). In **Tank Attack** seek and destroy enemy guns hidden among houses and trees before they get you. **Dodgem** — try to get your pieces across the board first. **Free for All** — airplane, ship, and submarine vie for each other. **Hidden Maze** — find your way through an invisible maze. $7.95.

Blank Cassettes

CT-C8. Blank C-8 cassettes with 4 minutes of tape per side. Perfect for one or two programs. Highest quality tape packaged in nifty red translucent cassettes in soft plastic box. $1.00 ea., 5 for $4.00.

creative computing software

sensational software

Apple II Software

CS-4001. Space Games-1. Four color-graphics programs for your Apple, including **Rocket Pilot** an advanced lunar lander simulation in which you guide your spacecraft over the mountain to a safe landing on the opposite side. In **Saucer Invasion**, you protect the earth by shooting down the alien invasion fleet with your missile launcher. In **Star Wars**, you line up the Tie fighters in your sights and fire before they get away. **Dynamic Bouncer** is a color graphics demonstration program for your Apple which fills the screen with colored walls that appear and disappear at random, while a ball bounces around within. $7.95.

CS-4002. Sports Games-1. Four exciting graphics games. Includes an amazing **Baseball** game for two players who control infielders and outfielders, type of pitch, and the swing of the bat. Even has sacrifices, double plays, and home runs. In **Torpedo Alley** try to sink as many enemy ships as possible. **Slalom** challenges you to ski through the gates in a minimum time. In **Darts** you try to throw your darts as close to the bullseye as possible by controlling the game paddles. $7.95.

CS-4003. Strategy Games-1. Play **Checkers*** in color against the Apple. **Skunk** is a dice game for one or two players. **UFO** is a space game in which you must outwit an enemy spaceship. **Blockade** with exciting graphics and sound effects, with a one or two player option. **Genius,** a challenging trivia quiz. *Requires Applesoft BASIC. $7.95.

CS-4004. Brain Games-1. Seven games and programs with fantastic sound effects. **Dodgem**, try to get your pieces across the board first. In **Parrot** you have to mimic the computer's letter/tone sequence. **Dueling Digits** is like Parrot but with numbers and tones. **Nuclear** is a game of skill for two players. **Midpoints** and **Lines** are two enjoyable graphic demonstrations. **Tones** allows you to make your own music. $7.95. (Available June).

CS-4201. CAI Programs-1. US Map asks you to identify states and their capitals. **Spelling** helps the user study a list of words he has previously entered. **Math Drill** for simple arithmetic problems. **Add-With-Carry** is a sophisticated tool for teaching addition of two and three place numbers by helping the student work the problem digit by digit, adjust to the student's level of skill. $7.95.

CS-4301. Know Yourself (5 Programs). Life Expectancy - will a different life style increase your life expectancy? **Psychotherapy** — analyze symptoms in your feelings and behavior to determine your mental health. **Computer Literacy** — what's yours? **Alcohol** — effect of alcohol on your behavior. **Sex Role** — are you androgynous? $7.95. (Available May).

CP/M Software

CS-9001. Games-1. An 8" floppy disc containing the first **fifty-one** games from *Basic Computer Games* in Microsoft Basic. All the games from **Acey Ducey** to **Hi-Q** including such favorites as **Animal, Bullfight, Craps,** and **Hangman.** (To run this, you need CP/M and Microsoft Basic.) $17.95.

CS-9002. Games-2. The second half of Basic Computer Games including **Life, LEM, Mugwump, Stars, 23 Matches, Word,** and forty-five others. A total of **fifty-one** games on an 8" floppy disc. $17.95.

CS-9000. Special Package. Two discs (CS-9001 and CS-9002) and the Basic Computer Games book. A $43.40 value for only $37.95.

CS-9003. Adventure (2 Versions). Explore an almost endless maze of caverns with incredible riches and hazards. You'll run into unusual creatures, quicksand, diamonds and rubies, a rusty ax and many other strange and beautiful things. Challenging and fun for all ages. Requires 48k CP/M and Microsoft BASIC. $17.95

Exidy Sorcerer Software

CS-5001. Graphics Games-2. (6 Games). LEM — lunar lander with display and optional auto pilot. **Nuclear Reaction** — two players bombard an atom with protons and electrons. **Pie Lob** — two players lob pies at each other over a sand castle. **Bounce** traces the path of a bouncing ball. **Checkers** — beginners game. **Dodgem** — try to get your pieces across the board first. $7.95.

SOL-20 Software

Write for latest releases.

creative computing software

Radio Shack TRS-80 Software

CS-2001. TRS-80 4k Level I Games-1. Battling **Deathstars,** an exciting two player realtime graphics game. **Hangman** challenges you to guess the computer's word before you're hung. **Lunar Lander** in which you try to land safely on the moon. Kid's **Math Race** teaches simple arithmetic. Or play **checkers** against your TRS-80. $7.95.

16K Level II Tapes

CS-3001. Board Games-1 (6 Games). Backgammon — the classic game. **Qubic** — try to get 4 pieces in a row on a 3-d board. **Flip Disc** — logic game similar to Othello. **Wumpus I and II** — hunt the Wumpus while avoiding pits, bats and other hazards. **Mugwump** — find it in hiding. $7.95.

CS-3002. Space Games-3 (4 Games). Ultra Trek — keep the galaxy safe from invading aliens. **Romulan** — outwit the sneaky invaders. **Star Wars** — get TIE fighters in your blaster sights. **Star Lanes** — the ultimate game of barter and trading. $7.95.

CS-3003. Adventure (2 Versions). Explore an almost endless maze of caverns with incredible riches and hazards. You'll run into unusual creatures, quicksand, diamonds and rubies, a rusty ax and many other strange and beautiful things. Challenging and fun for all ages. $14.95.

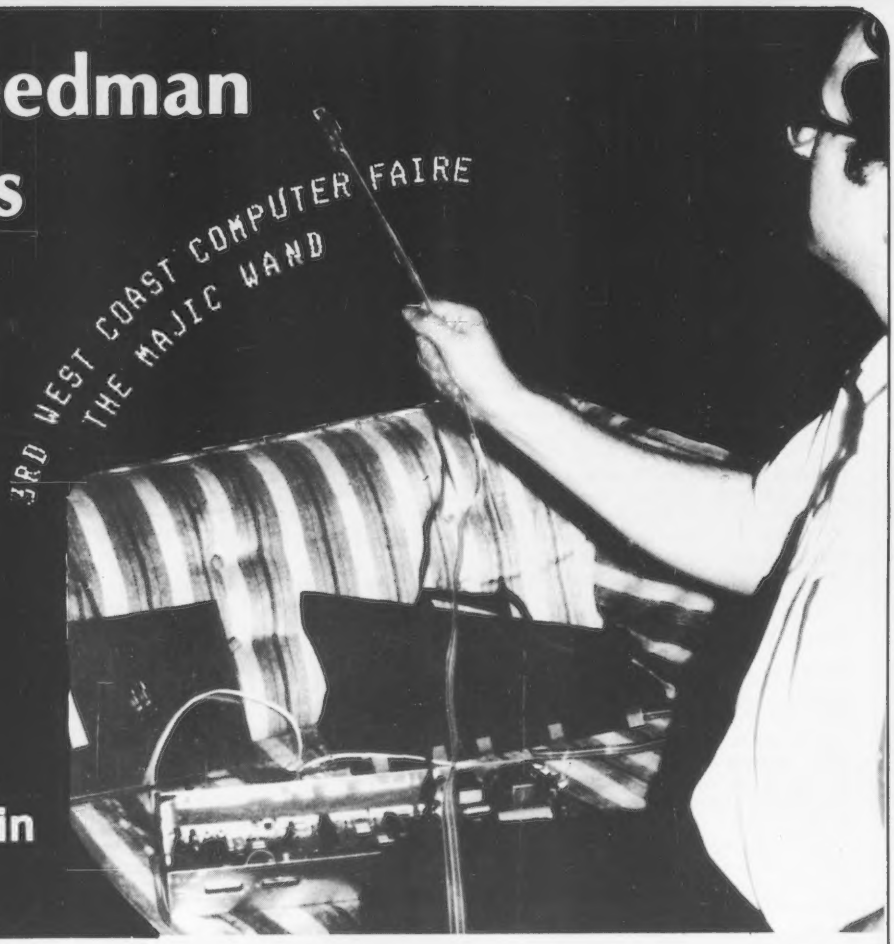
CS-3201. Ecology Simulations-1 (4 Programs). Simulations adapted from Huntington II Project. **POP** — explore three population growth models. **STERL** — vary use of pesticides vs. release of sterile males to control fly pest population. **TAG** — Use "tagging-and-recovery" sampling technique to estimate the number of fish in a pond. **BUFFALO** —Manage a Buffalo herd to allow hunting while keeping buffalo from becoming extinct. Comes complete with extensive resource manual. $24.95.

To Order...

Creative Computing Software should be stocked by your local retail computer store. If your favorite outlet doesn't yet offer it, have him call C.J. at 800-631-8112. (In NJ, 201-540-0445).

Or you can order directly from Creative Computing. Send your check for tapes plus $1.00 shipping and handling per order to Creative Computing Software, P.O. Box 789-M, Morristown, NJ 07960. NJ residents add 5% sales tax. Visa or Master Charge are acceptable also. For faster service, call in your bank card order toll free to 800-631-8112. (In NJ, 201-540-0445).

Bob Freedman and His Majic Wand



Lee Felsenstein

At the Third West Coast Computer Faire in Los Angeles in 1978 there was an odd display booth in which a table was stacked on top of another table. Cloth was draped around the three sides away from the viewer, so that the upper table formed a "shadow box" — an area of subdued light.

Seated at a chair with his elbow resting on the lower table was Bob Freedman, inventor of the "Majic Wand" retinal display device. Bob was gradually developing a bruised elbow from continually waving his product before the enchanted and befuddled passersby. The viewers had two types of reactions — either a quizzical stare followed by a burst of hysterical laughter, after which they would walk away, or a quizzical stare followed by some brusque questions about what it was good for. I was one of the laughers, having discovered in Bob's invention the best kind of idea — one which is perfectly obvious once it is demonstrated.

The Majic Wand retinal display device consists of a strip of flexible material (printed circuit board material in this case) with a short row of red light-emitting diodes at one end. A cable leads off to a cigar-box-sized microcomputer. At rest it has no visible function, but when it is waved to and fro so that the end of the wand describes an arc, there appears a line of alphanumeric characters in mid-air which spells out a message!

A high speed camera would show no message at all — just the wand in mid-swing with some of the LEDs lit and some dark. The writing that you see hovering in space is the after-image which persistence of vision leaves behind on your retina when the image of the LEDs sweeps by. The patterns which the row of LEDs flash are the same patterns which a row of dot matrix printer needles would tap out across the paper as the print head traverses printing the same message.

The only real trick to the wand is the "inertial switch" which closes as the wand reverses its direction and synchronizes the start of the next display line. All the rest is perfectly obvious — except that no one thought of it until Bob came along. He has had the prudence to patent several aspects of his design, although there is no restriction on making one for personal use only.

The only real trick to the wand is the "intertial switch" which closes as the wand reverses its direction and synchronizes the start of the next display line.

The retinal display effect is relied

Lee Felsenstein, Golemics, Inc., 1407 Addison St., Berkeley, CA 94702.

upon in television display technology, and the earliest televisions used a rotating disc with patterns of holes punched in them to effect the sweeping of the light from a flashing neon lamp over the picture field. If LEDs had been available then, suggests Bob, TVs would probably contain a rotating disc with LEDs mounted on it, each one flashing its line of the picture as it swept by. The cathode ray tube would never have made it into the big time.

There's not too much else you can say about the retinal display, but to me the interesting question is why it didn't happen until now. Relaxing after the show, Bob discussed the genesis of the idea and his own odyssey which led him to realize it.

"In prep school I once asked an English teacher what the definition of an intellectual was," Bob remembers. "He said that it was someone who always asked questions which led to other questions, and that the intellectual was never satisfied with the answers. I decided then that I would ask questions and never take the answer for granted.

"Following up, asking question after question, and twisting around to look at a problem from all directions can lead to things you don't think of normally. Occasionally out pops a gem — after doing a lot of work. Asking questions and following out dead ends until finally you get things right, then — eureka!"

Bob's first experience with a computer was with an IBM 1620 at an open house held by the chemistry department of a Boston university. Bob had a habit of working out powers of two by repetitive doubling during periods of boredom. At the open house he found that he could automate his doubling and generate huge tables of 2 powers. "I've gotta have one of them!" he told himself. It was 1961 and the world's first minicomputer was scarcely a year old.

A teacher in prep school told him that the four digits of accuracy available from a slide rule were sufficient for any calculation. Bob disputed that claim and set out to build a computer. He used transistors available on the surplus market for four cents each when the first generation of transistorized computers was scrapped out. He designed flip-flops and gates from books written in the '50s, etched his own circuit cards and came up with a desk calculator with neon Nixie tube readouts showing five digits of precision and two digits of exponent. It could add, subtract, multiply and divide. Internally he did all operations in decimal — Bob hadn't yet heard about binary!

After prep school Bob did not go directly to college, but hired on in 1967 with Control Data Corporation "cold, with no experience in computers." He got frequent access to their 3300 computer and worked on computer graphics and digital signal processing. He helped make movies for the National Film Board of Canada and presented a paper in 1970 at the International Computer Graphics Symposium. Shortly thereafter he entered M.I.T. as a "special student." He went outside of the usual channels with the assistance of professors who filled out the first page of the forms for him and threw the rest away.

Following graduation Bob went freelance designing hardware and software from his home in Lawrence, Mass. All during the last ten years he has been mulling over the problem of having a portable computer or at least a portable means of accessing a timesharing computer. A familiar problem indeed! To Bob this resolved to the problem of an inexpensive, portable alphanumeric display. He looked at the Burroughs Self-Scan panel plasma display but was put off by the price.

Bob continued to hypothesize, analyze, criticize, modify and rationalize his ideas on the topic until he was ready to see the obvious. One day he dropped his calculator while it was turned on. He saw a cascade of zeroes in free space. Why a cascade of separate zeroes and not just a red blur?

One day he dropped his calculator while it was turned on. He saw a cascade of zeroes in free space. Why a cascade of separate zeroes and not just a red blur?

Bob quickly found out that the calculator never displayed all of its digits at one time, but scanned them one at a time to save battery power. The retina's persistence of vision smoothed out the flicker and made it look like a single steady display. Of major importance to designers in the field of scanned displays is the "flicker fusion frequency" at which the scanned display appears to stop flickering and solidify.

Bob turned the question around. What if the problem were not to fool the eye into reporting that all of the digits of a stationary display were on, but rather to move the display so that a legible message would be created on the retina by persistence of vision? How long a message could you get? How bright should it be? How stable would the sweep have to be? How would viewers react to a message appearing in thin air?

The falling calculator represented the turning point in Bob Freedman's quest. He is adamant in insisting that the idea did not come to him full-blown at that instant — that he had prepared himself to take advantage of a commonplace occurrence and that he had to follow through with a lot of work to develop the idea.

And he's right. I remember waving a calculator around and smiling at the funny patterns I saw. But I stopped it and got back to serious stuff.

Oh yes, for those who are still wondering what the uses might be of such a thing, Bob points out the usefulness of the wand as part of store window displays (since the inertial switch can easily activate a solenoid plunger which keeps the wand waving), and had tried his device in the form of a roadside display called the Ad-Pole. It looks like a pole with red lights on it when viewed from rest, he reports, and the message can be seen only by someone in motion. It works, and has the added advantage of not disrupting the landscape. As an added advantage, motorcycle cops can't hide behind it!

And what about the portable terminal? Hasn't that idea faded with the march of technology, especially since the electronics used to control the display constitutes a computer in itself? Bob points out that the personal communication terminal is yet to come, and that the most likely technology of interconnection will utilize a radio link such as the 800 MHZ "cellular radio" schemes now being tested. Where there's radio there are antennas — whip antennas for high frequencies.

Whip antennas can be waved back and forth. That's where the display is going to be.

Bob Freedman can be reached by mail at P.O. Box 1136, Lawrence, MA 01842. □

ROBOT ROVER or Build Your Own Pavlovian Pooch

Frederick W. Chesson

Frederick Chesson tempts a robot dog with a magnetic bone. These dogs, constructed in the mid-1960's, used electromechanical relays in the large carrying cases. The dogs exhibited Pavlovian conditioned learning responses.

In a previous article on Robotic Hierarchies (**Interface Age** for April, 1978), the section on Simulators included the description of a robot dog designed to demonstrate the conditioned reflex of classic learning theory. Two models were built by the author in the mid-1960's, as shown in the photograph, based upon ideas developed in the early Fifties. While the original models were oriented towards static classroom display and teaching-machine concepts, the essential circuitry could easily be incorporated into a free-wheeling independent robot.

To review the basic concepts of conditioning and learning theory, we will look beyond simple cause and effect, to the effects of repeated cause and effect events upon an organism. It has long been observed in nature, that when a stimulus which is always reacted upon (like a finger flinching from a hot stove) is accompanied by a normal passive stimulus, then eventually this neutral stimulus tends to evoke the active response.

In the late nineteenth and early twentieth centuries, the Russian physiologist Ivan P. Pavlov conducted a series of carefully controlled experiments which were to gain him the Nobel Prize for Physiology and Medicine in 1904 and worldwide recognition. The now classic experiment involved feeding a laboratory dog and measuring the response in terms of saliva flow. When a bell was rung at the time of feeding, the dog would eventually salivate to the sound of the bell alone. This process is called conditioning, and functions as well with human subjects, who may find their mouths watering at the mere mention of dinner time or the description of a gourmet treat.

Frederick W. Chesson, 144 Fiske Street, Waterbury, CT 06710.

The Circuitry

For simulation, it was decided that canine tail-wagging was an easier response than salivation to display and just as generally valid. In the models shown, this was accomplished through a counter-balanced sheet aluminum or plastic member, activated by a solenoid driven by a transistorized tail-wagging power amplifier. For increased realism, a small magnet was concealed in one end of a simulated bone. When brought near the dog's nose, it tripped a reed switch, activating the tail-wagging response. To determine when active and passive stimuli coincide, a comparator or AND Gate is required. A counter then stores the number of such pairings, until at some pre-determined counts, a transfer mechanism causes the response mechanism to respond to both types of stimuli. The original concept (see Figure 1) and first prototype (photo of relay board) of the simulator embodied stepping relays and other electro-mechanical components. Today, all functions could be easily accommodated with a few integrated circuits on a small printed circuit board, thereby allowing robot mobility.

Should the new conditioned stimulus (bell) repeatedly fail to be followed by reinforcement (food), then eventually extinction (forgetting) will occur. If our meals are absent or uniformally dull, then the dinner bell or call will no longer evoke mouth-watering. Interestingly enough, such is the apparent "faith" of the conditioning mechanism in organisms, that a single reinforcement, like an unexpectedly tasty meal, will enable the conditioning to become resistant to future disappointments.

This simulation of extinction is accomplished by counting anti-coincidences, stimuli not followed by food, so that eventually the transfer mechanism is reset to its initial state. However, this may be prevented by a single coincidence output from the AND Gate.

The basic circuit for conditioning and extinction described above is easily breadboarded for experimentation. Photo cells and microphones become the eyes and ears of the robot world. The type 4017 decimal-decoded counter replaces the stepping relay of an earlier cybernetic age. This CMOS integrated circuit and other members of its family may be used to construct a complete simulator or robot.

Applications

The original Robot Dogs embodied some additional concepts, which are worth mentioning for inclusion in the basic device.

Spontaneous Recovery: Dr. Pavlov and others sometimes noted that their experimental animals would recover their conditioned state following extinction, without any apparent external stimulation. This effect is similar to looking up a telephone number in the morning, totally "forgetting" it by noon, only to have it suddenly return hours, or even days, later. In simulation, this may be accomplished by a timer IC, such as the type 555 chip, and another flip-flop to make the action a one-time event.

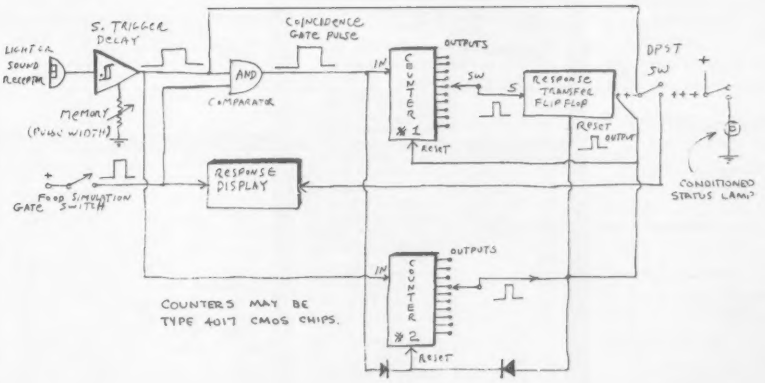
Learning Curves: Relearning something "the second time around" is always easier than the first time, and seems to last longer, as well. In direct terms, following extinction, reconditioning will take a fewer number of AND gate outputs, and re-extinction will require a greater number of anti-coincidences. In the original models, massive multi-level stepping relays were required. Now, extra type 4017 counters and associated transmission gates in the CMOS family add little cost and almost no additional weight to simulate this important function. Another aspect of learning would be increased memory retention of the bell or other stimulus. This could be effected by increasing the resistance of the RC timing circuit in the Schmitt-trigger or monostable gate of the stimulus receptor.

Higher Order Conditioning: After a dog had been repeatedly trained, learning and forgetting, over a period of time, Pavlov and other experimenters found that the sound of the bell could be used as well as food itself for the conditioning of a new stimulus, such as a colored or flashing light. This important learning concept can be simulated by counting the outputs of the conditioning counter, generally disregarding the actions of the Spontaneous Recovery circuitry. At a predetermined count, the output of the first (sound) receptor is switched over to the response (tail-wagging mechanism), the output of the second receptor (light) is transfered into the input of the AND Gate. All counters are then reset, so that the learning process may be applied to the new stimulus.

A more advanced learning concept called variable reinforcement scheduling, is an additional possibility for simulation. In essence, it has been found that conditioning is more resistant to extinction if the neutral stimulus is **not** always followed by reward. In human gastronomic terms, if the dinner bell does not constantly announce an actual meal on the table, we will be inclined to overlook occasional future disappointments and continue to feel our mouths to water at its inviting chime. V.R.S. is by its variable nature a feature which lends itself to micro-processing applications.

Summary

A robot thus equipped with the above-described features is now able to cope with a variety of external influences and to learn to deal advantageously with future events. When the dinner bell of the future tolls, both humans and robots will respond, having been conditioned by the ghost of Dr. Pavlov and CMOS chips to anticipate prime sirloin or freshly-charged NiCad batteries, respectively! □



Basic Conditioning Simulator Circuit

Bibliography

Non-Fiction

— Analog version of Pavlovian Dog in "Amateur Scientist" Column. **Scientific American**, June, 1963.

Ashby, W.R. "Design for a Brain," **Electronic Engineering** Dec., 1948.

de Camp, L. **Science Fiction Handbook**. New York: Hermitage House, 1953.

Chesson, F.W. "Robot Hierarchies," **Interface Age**, April, 1978.

— "Computer Chess," **Chess Life and Review**, June, 1977.

Feigenbaum and Feldman, ed. **Computers and Thought**. New York: McGraw-Hill, 1963.

Gardner, Martin. **Logic Machines and Diagrams**. New York: McGraw-Hill, 1958.

Goode and Machol. **System Engineering**. New York: McGraw-Hill, 1957.

Halacy, D.S. **Computers: The Machines We Think With**. New York: Dell, 1965.

Jackson, Philip C. **Introduction to Artificial Intelligence**. New York: Petrocelli, 1974.

Kaplan, Michael, ed. **The Essential Works of Pavlov**. New York: Bantam, 1966.

de Latil, Pierre. **Thinking by Machine** (American Edition). Boston: Houghton-Mifflin, 1957.

Lancaster, Don. **CMOS Cookbook**. Indianapolis, IN: Howard Sams and Co., 1977.

— "Man Beats Machine," **Scientific American**, November, 1978.

Michie, Donald. **On Machine Intelligence**. New York: Wiley, 1974.

Raphael, Bertram. **The Thinking Computer**. San Francisco: Fremman, 1976.

Wiener, Norbert. **Cybernetics**. New York: Wiley, 1948.

Fiction

Asimov, Isaac. **I, Robot**. New York: Fawcett-Medallion, 1976.

Bayley, Barrington. **Soul of the Robot**. New York: Doubleday, 1974.

Cooper, Edmund. **The Overman Culture**. New York: Berkley, 1973.

DEGREES OF AUTOMATISM

CLASSIFICATION OF EFFECTORS			COMPONENT OF ACTION: Not controlled by the effector	COMPONENT OF ACTION: Controlled by the effector	EXAMPLES
DETERMINED EFFECTS	TOOL	*Limitation.*—A tool cannot act by itself.	*Material* for activity. *Power* of activity. *End-goal* of activity. *Determinism* of activity. *Opportunity* for activity. *Activity.* *Co-ordination* of several activities. *Stabilization* of activity.	*Aptitude* for the activity.	Lever. Hammer. Pliers. Scissors.
	EFFECTORS *1st degree* Effector with determined activity.	*Efficiency.*— the effector executes a simple action. *Sensitivity.*—The effector is only able to react to a certain stimulus. *Limitation.*—The effector cannot adapt its activity to circumstances.	*Material* for activity. *Power* of activity. *End-goal* of activity. *Determinism* of activity. *Opportunity* for activity. *Co-ordination* of several activities. *Stabilization* of activity.	*Aptitude* for the activity. *Activity.*	Pianoforte key. Typewriter key. Grinding mill. Hand-brake. Steam-hammer.
	2nd degree Effector with complex activity.	*Efficiency.*—The effector co-ordinates several simple actions. *Sensitivity.*—The effector is only able to react to a certain complex of allied and determined stimuli. *Limitation.*—The effector cannot adapt its activity to the circumstances.	*Material* for activity. *Power* of activity. *End-goal* of activity. *Determinism* of activity. *Opportunity* for activity. *Stabilization* of activity.	*Aptitude* for the activity. *Activity.* *Co-ordination* of several activities.	Most machine tools. Most clockwork movements. Calculating machines. Most classical types of machinery.
	3rd degree Effector with conditioned activity.	*Efficiency.*—The effector acts in certain circumstances. *Sensitivity.*—The effector is able to react to certain stimuli, selected by its deterministic plan. *Limitations.*—The effector cannot adapt its activity to circumstances beyond its deterministic plan.	*Material* for activity. *Power* of activity. *End-goal* of activity. *Determinism* of activity. *Stabilization* of activity.	*Aptitude* for the activity. *Co-ordination* of several activities. *Activity.* *Opportunity* for activity.	Automatic fire-alarm. Automatic obstacle detector.
	BEGINNING OF CYBERNETICS				
ORGANIZED EFFECTS — Freedom of "How to do?"	*4th degree* Effector with stabilized activity (with internal stabilization.)	*Efficiency.*—The effector stabilizes its own activity. *Sensitivity.*—The operative stimuli need not be determined. They only modify the effect without modifying its determinism. (The effector is sensitive to its own activities.) *Limitation.*—The effector can only act in accordance with a single determinism.	*Material* for activity. *Power* of activity. *End-goal* of activity. *Determinism* of activity.	*Aptitude* for activity. *Activity.* *Co-ordination* of several activities. *Opportunity* for activity. *Stabilization* of activity.	Watt governor. Hopper supplying windmill with corn for grinding. (Baille-blé.) Automatic volume control. Automatic pilot. Differential analyser.
	END OF CLASSICAL MECHANISMS				
ORGANIZED EFFECTS — Freedom of "How to do?"	*5th degree* Effector with continued activity. (Internal determinism.)	*Efficiency.*—The effector is goal-seeking. *Sensitivity.*—The facultative stimuli that modify the effect may also modify the determinism. *Limitation.*—The effector can only act in accordance with its fixed end goal.	*Material* for activity. *Power* of activity. *End-goal* of the activity.	*Aptitude* for activity. *Activity.* *Co-ordination* of several activities. *Opportunity* for action. *Stabilization* of activity. *Determinism* of activity.	Ashby's Homeostat and DAMS.
ORGANIZED EFFECTS — Freedom of "What to do?"	*6th degree* Effector with multiple activity (internal end goal).	*Efficiency.*—The effector is goal-seeking. *Sensitivity.*—The facultative stimuli which modify the effect may modify not only the determinism but also the end goal. *Limitation.*—The effector can only act within the limits of its predetermined possibilities.	*Material* for activity. *Power* of activity.	*Aptitude* for activity. *Activity.* *Co-ordination* of several activities. *Opportunity* for activity. *Stabilization* of activity. *Determinism* of activity. *End-goal* of activity.	Multistat Man.
	LIMITATION OF MAN AND MACHINES				
TRANSCENDENTAL EFFECTS — Freedom of "Who does it?"	*7th degree* Effector determining its own activity. (Internal determinism.)	*Efficiency and Sensitivity.*—The effector modifies its own sensitivity and efficiency. *Limitation.*—The effector can only act on the material given to it.	*Material* for activity.	*Aptitude* for activity. *Activity.* *Co-ordination* of several activities. *Opportunity* for activity. *Stabilization* of activity. *Determinism* of activity. *End-goal* of activity. *Power* of activity.	Living species in process of evolution.
TRANSCENDENTAL EFFECTS — Freedom of "Who does it?"	*8th degree* (?) Effector acting on the whole (Internal creativity).	*Efficiency.*—The effector creates the material on which it acts (?).		*Aptitude* for activity. *Activity.* *Co-ordination* of several activities. *Opportunity* for action. *Stabilization* of activity. *Determinism* of activity. *End-goal* of activity. *Power* of activity. *Material* for activity.	Mechanism of auto-creation of inter-galactic matter according to the Hoyle-Littleton theory (?)

Table from "Thinking Machine" (1957) by P. de Latil. The robot dog described in the article would probably fall between Degrees 3 and 4 of "Classification of Effectors."

ADVANCED COMPUTER PRODUCTS

NEW CATALOG AVAILABLE NOW!

THE FIRST TO OFFER PRIME PRODUCTS TO THE HOBBYIST AT FAIR PRICES NOW LOWERS PRICES EVEN FURTHER!

1. Proven Quality Factory tested products only, no re-tests or fallouts. Guaranteed money back. We stand behind our products.

1979 CATALOG NOW AVAILABLE

Send $1.00 for your copy of the most complete catalog of computer products. A must for the serious computer user.

STATIC RAM BOARDS

Now just more than 1½¢ per bit!

S-100 32K (uses 2114)

ASSEMBLED		Kit
450ns. 599.00		450ns. 539.95
250ns. 699.95		250ns. 599.95

Bare Board 49.95
Bare Board w/all parts less mem. 99.95

S-100 16K (uses 2114) KIT (exp. to 32K)

ASSEMBLED		
450ns. 325.00	450ns.	279.00
250ns. 375.00	250ns.	299.00

Bare Board 49.95

LOGOS I 8K

ASSEMBLED		
450 ns. 169.95	KIT 450ns.	125.95
250ns. 189.95	250ns.	149.95

Bare PC Board w/Data $21.95
Now over 1 year successful field experience
"Special Offer" Buy (4) 8K 450ns. Kits $117.00

FLOPPY DISK DRIVES

1. VISTA V-80 MINIDISK FOR TRS-80
★ 23% More Storage Capacity - 40 Tracks
★ Faster Drive - Up to 8 Times Faster
395.00

2. VISTA V-200 MINI-FLOPPY SYSTEM
★ 204K Byte Capacity ★ w/CPM, Basic "E"
★ One Single Sided, Double Density Drive
★ One Double Density Controller w/Case & P.S.
V-200 699.00
Add to your EXIDY, HORIZON, etc.

3. VISTA V-250 FLOPPY DISK SYSTEM
★ (2) Shugart 800-R 8" Floppy Disks
★ Controller Card, Cable, Case & P.S.
★ CPM & Basic "E", Instructions & Manual
V-250 2199.00

4. MPI B51-5¼", 40 tracks 279.00
5. Shugart SA400-5¼", 35 tracks..... 295.00
6. Siemens/GSI FDD100-8 8"..... 375.00
7. Shugart 800/801R 8" 495.00
8. PERSCI Model 277 Dual..... 1195.00

EXPANDORAM MEMORY KITS

★ Bank Selectable ★ Uses 4115 or 4116 200 ns.
★ Write Protect ★ Power 8VDC, ±16VDC
★ Phantom ★ Lowest Cost/Bit

Expando 32 Kit(4115)	Expando 64 Kit(4116)
8K $179.00	16K $248.95
16K $229.00	32K $369.00
24K $299.00	48K $469.00
32K $349.00	64K $565.00

IMS STATIC RAM BOARDS $699.00

★ Memory Mapping ★ Low Power
★ Phantom ★ Assembled & tested
Recommended by Alphamicrosystems

	250 ns.	450 ns.
8K Static	$209.00	$189.00
16K Static	$449.00	$399.00
32K Static	$799.00	$699.00

ANADEX PRINTER

Model DP-8000 compact, impact, parallel or serial. Sprocket feed, 80 cols, 84 lines/min., bi-directional. New only $895.00

VERBATIM™ DISKETTES

LOW PRICE TOP QUALITY DISKETTES

★ 5¼" Minidiskettes ★
Softsector, 10 Sector, 16 Sector
$4.25 Each, 10/39.95
★ 8" Standard Floppy Disks ★
Soft Sector, Hard Sector
$4.50 Each, 10/41.95
*Add 4.95 for 10 Pack in Deluxe Disk Holder

6800

MOTOROLA EXORCISER COMPATIBLE

9600 MPU Module w/6802 CPU..... $495.00
9601 16 Slot Mother Board..... 295.00
9602 Card Cage (19" Retma Rack Mount)... 75.00
9603 8 Slot Mother Board..... 100.00
9604 Switchmode System Power Supply..... 250.00
9610 Utility Prototyping Board..... 36.00
9616 Quad 8K Eprom Module..... ***
9620 16 Channel Parallel I/O Module..... 295.00
9622 Serial/Parallel I/O Combo..... ***
9626 8K Static RAM Module..... 295.00
9627 16K Static 450ns..... 495.00
9630 Card Extender..... 68.00
9640 Multiple Programmable Timer (24 Timers)..... 395.00
9650 8 Channel Duplex Serial I/O..... 395.00
96103 32/32 I/O Module..... 275.00
96702 32 Point Reed Relay Module..... 350.00

6800 BARE BOARDS

9620-0..... $45.00 9603-0..... 27.00
9626-0..... 45.00 9600..... 55.00
9650-0..... 45.00 96103..... 55.00
9601-0..... 50.00 96702..... 55.00
Also AMI EVK System in Stock

APPLE/EXIDY/EXPANDO TRS 80 16K-UPGRADE KIT

★ 16K with Jumpers & Instructions for either Level I or Level II $89.95
★ 16K for Apple II Upgrade..... $89.95
Special: TRS80 Schematic..... $ 4.95
Expansion Interface Schematic.... $ 4.95

TRS 80 TO S-100 PET TO S-100 ADAPTER

Allows Pet/TRS 80 to be interfaced to popular S-100 Bus.
Pet to S-100 Kit $189.95
Assembled..... $269.95
TRS 80 to S-100 HUH 8100 Kit $275.00
Assembled..... $355.00

KEYBOARD ASCII ENCODED

One time purchase of NEW Surplus key-boards. From the Singer Corporation. The keyboard features 128 ASCII characters in a 63 key format, MOS encoder circuitry "N" key rollover, lighted shift lock, control, escape and repeat functions. Ltd Qty **63 KEY $59.95**

UV "Eprom" Eraser

Model UVs-11E $64.95
Holds 4 Eprom's at a time. Backed by 45 years experience.
Model S-52T...$219.95
Professional Industrial Model

TARBELL FLOPPY INTERFACE

★ Z80/8080 S100 Compatible ★ Uses CPM
Assembled for Shugart... **SALE $229.00**
Assembled Other Drives..... $269.95
Kit..... $179.95
Bare Board..... $36.95 (Doc. Add $10.00)
Note: For CAM Add 10.00. Documentation Add $20.00
Vista Double Density 5¼" Controller Assem..... $299.00
SD Versa Floppy Kit..... $159.95
SA Verta Floppy Assembled..... $189.95
Tarbel Cassette I/O Kit..... $115.00
Set ★ 1771-01 Floppy Chip..... $27.95

BYTE USER 8K EPROM BOARD

★ Power on Jump ★ Reset Jump
Assembled & Tested..... $94.95
Byteuser Kit..... $64.95
Bare PC Board..... $21.95
Special Offer: Buy 4 kits only $59.95 each
MR-8 8K w/1K Ram..... $99.50
MR-16 16K w/1K Ram..... $99.50
EPM-1 4K 1702..... $59.95
EPM-2 2708 or 2716 Eprom..... $69.95

Z-80/Z-80A/8080 CPU BOARD

★ On board 2708 ★ 2708 included (450ns.)
★ Power on jump ★ completely socketed
Assembled and tested..... $185.00
Kit..... $129.95
Bare PC Board..... $ 34.95
★ For 4MHz Speed Add $15.00
8080A Kit..... $ 99.95
8080A Assembled..... $149.95

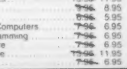
S-100 MOTHERBOARD SPECIAL

8 slot expandable w/9 conn.
reg $69.95..... NOW $52.95

PQC PROGRAMMABLE CHARACTER GENERATOR

The hottest version of STARWARS available from Objective Design
S-100 Compatible 2MHz Kit with object code on tarbell or cuts..... $169.95

ACOUSTIC MODEM



NOVATION CAT™
0-300 Baud
Bell 103
Answer, Originate $198.00

ACOUSTIC COUPLER SPECIAL

AJ MODEL A30
SPECIAL PURCHASE
OF SURPLUS UNITS
AVAILABILITY LIMITED $29.95

DATA BOOKS • COMPUTER BOOKS

1978 IC Master	49.95	Intel MCS 80 Manual	7.95
NSC Linear	4.95	Intel MCS 40 Manual	4.95
NSC Linear App Notes II	3.95	AMD 8080A Manual	5.95
NSC CMOS	3.95	AMD Schottky Databook	4.95
NSC Memory	3.95	GI MOS/LSI Data	4.95
Intel Databook	4.95	Harris Analog Databook	4.95
Intel MCS 85 Manual	7.50	TI Linear Control Data	3.95

SALE • OSBORNE BOOKS • SALE

	Reg.	Sale
Intro to Micros Vol. 0	$10	7.75
Intro to Micros Vol. I	$10	7.75
8080A Programming	$10	7.75
6800 Programming	$10	7.75
Z80 Programming	$10	7.75
Vol. II Some Real Microprocessors w/Binder	$35.00	27.50
Vol. III Some Real Support Devices w/Binder	$20.00	18.50
Intro to Micros Vol. III	$20.00	18.50

SALE • DILITHIUM COMPUTER BOOKS • SALE

Understanding Computers	$9.95	7.95
8080/Microcomputer Experiments	$13.95	11.95
Beginning BASIC	$9.95	8.95
Beginners Glossary & Guide	$7.95	5.95
Peanut Butter & Jelly Guide to Computers	$7.95	6.95
8080 Machine Language Programming	$7.95	6.95
Home Computers Vol. I Hardware	$7.95	6.95
Home Computers Vol. II Software	$19.95	11.95
Starship Simulator	$7.95	6.95

MICROPROCESSORS

Z-80	$16.95
Z-80A	18.95
F-8 (3850)	16.95
2650	18.95
CD1802	19.95
8080A	8.95
8080A-4MHz	19.95
SALE 8085	**19.95**
8008-1	14.95
2901	16.95
2901A	24.95
TMS 9900JL	49.95
CP1600	39.95
6502	11.50
6502A	19.95
IM6100	29.95
6800	16.95
6802/P	24.95
8035	17.50
8755	49.95
8748	69.95

SUPPORT DEVICES

AM9511 Arith Processor	$195.00
AM 9511-1 300 ns	245.00
AM9517 DMA Controller	71.95
AM9519 Universal Interrupt	24.95
3881 (Z80 PIO)	10.45
3881-4 (4MHz)	14.95
3862 (Z-80 CTC)	10.45
3862-4 (4MHz)	14.95
8205-74S138 Decoder	2.95
8212 8 bit I/O	2.50
8214 Priority Int	4.95
8216 Bus Driver	2.50
8224 Clock Gen	2.95
8224-4 (4MHz)	9.75
8226 Bus Driver	3.95
8T26 Bus Driver	2.39
8228 Sys Control	5.95
8238 Sys. Cont	6.25
8251 Prog. I/O	6.95
8253 Int. Timer	19.50
8255 Prog. I/O	6.50
8257 Prog. DMA	19.50
8259 Prog. Int	19.50
8275 CRT Controller	74.95
8279 Prog. Keyboard	19.95
6810-1 128 x 8 RAM	4.75
6820 PIA	6.50
6821 PIA	6.50
6828 Priority Int	11.00
6834-1 512 x 8 Eprom	12.95
6850 ACIA	7.20
6852 Serial Adapter	9.95
6845 HD46505 CRT Contr	39.95
6860 Modem	9.95
6862 Modulator	11.95
68714 1.0MHz OSC	25.95
6875	8.25
6880 Bus Driver	2.39
MC6844B	19.95
1821 SCD 1K RAM	25.00
1822 SCD 256 x 4 RAM	16.95
1824 CD 32 x 8 RAM	9.95
1852 CD 8 bit I/O	10.95
1854 Uart	19.95
1856 CD I/O	8.95
1857 CD I/O	8.95
8520 PIA	7.50
6522 VIA	9.25
6530-002	15.50
6530-003	15.50
6530-004	15.50
6530-005	15.50
3851 F8 Prog. Store	14.95
3853 F8 Memory I/O	14.95

DYNAMIC RAMS

416/4116 16K (16 Pin)			12.45
Set of 4 16K's			89.95
4115 8K (16 Pins)			6.95
4050 4K x 1 (18 Pins)			4.25
4060 4K x 1 (22 Pins)			9.95
4096 4K x 1 (16 Pins)			3.95
2104 4K x 1 (16 Pins)			4.75
4027 4K x 1 (16 Pins)			4.95
5261 1.95	1103	1.95	
5262 1.95	4008L	4.95	
5270 4.95	6605	7.95	
5280 4.95	6604	4.95	
5290 12.45	6002	1.50	

PROMS

2708	3.95
2708-6	7.50
1702A	3.95
1702A-6	3.50
2716-5V	59.95
2716-5V, 12V	40.00
2758 5V	29.95
5203AQ	11.95
5204AQ	9.95
6834-1	12.95
IM 5610	2.95
SALE 8223 32 x 8	**3.95**
82S115 512 x 8 (TS)	16.95
82S123 32 x 8	2.50
82S126 256 x 4	3.50
82S129 256 x 4 (TS)	3.50
82S130 512 x 4 (OC)	6.50
NSC DM7578 32 x 8	2.95

CHARACTER GEN

2513-001 (5V) Upper	9.50
2513-005 (5V) Lower	10.95
2513-ADM3 (5V) Lower	14.95
MCM6571	10.75
MCM6571A	10.75
MCM6574	14.50
MCM6575	14.50

UARTS/USRTS

TR1602B (5V 12V)	3.95
AY5-1013 (5V, 12V)	4.95
AY5-1014A-1612 (5-14V)	6.95
AY5-1015A-1863 (5V)	6.95
TMS 6011 (5V, 12V)	5.50
IM6402	7.95
IM6403	8.95
2350 USRT	9.95
1671B Astros	24.95
SALE TR1472B	**9.95**

BAUD RATE GEN

MC14411	11.95
4702	14.95
WD1941	9.95

KEYBOARD ENCODERS

AY5-2376	13.75
AY5-3600	13.75
HD0165	9.95
74C922	9.95
74C923	9.95

A/D CONVERTERS

8700 8 bit Binary	13.50
8701 10 bit Binary	22.00
8703 8 bit TS	13.50
9400 Volt to Freq Conv	7.25
8750 3-1/2 Digit BCD	13.95
1408L6 6 bit	3.95
1408L8 8 bit	5.95
DAC0I-A/D	5.95

STATIC RAM HEADQUARTERS

	1-24	25-99	100
2114L2 450ns.	1.30	1.25	1.15
2114L2 250ns.	1.59	1.55	1.45
2102	1.25	1.15	1.10
2111	3.75	3.65	3.55
2101-1	2.95	2.85	2.65
2101-1	2.90	2.70	2.55
2114L-250ns.	12.95	10.95	9.95
2114L-300ns.	8.95	7.95	6.45
2114L-450ns.	7.50	6.75	**4.75**
4044/4041 300ns.	9.95	8.75	7.95
4044/4041 450ns.	7.50	6.75	**4.75**
EMM4200A	9.75	8.75	7.95
EMM4402	7.95	7.25	6.25
EMM4804	12.50	11.50	9.95
5101-CE	7.95	7.95	7.25
2u5410/4200/	10.95	10.25	9.25
AMD9140-41	10.95	10.25	9.25
AMD9130-31	12.95	11.95	10.25
FSC 460 4641K CCD Only	$18.95 Each		
1101	1.95	1.75	1.25
P2125/93425 450 ns	7.95	7.35	7.25
6508 1K x 1 CMOS	7.95	7.95	7.25
6518 1K x 1 CMOS	7.95	7.95	7.25
145189 64 bit Ram	3.95	3.25	2.50
8155 I/O w/Ram 21.95			
2147 Low Power 4K Static 14.95 ea.			

CHARGE COUPLED DEVICES

16K CCD - First time offered Fairchild 460 CCD
16K Memory now you can experiment with CCD technology at a reasonable price. 17 page Applications note supplied with each order. Quantity limited!
$18.95 each (reg. 43.00)

CRYSTALS

Microprocessor Timebases TV Game

Frequency	Price	Frequency	Price
1.0MHz	$5.85	5.0MHz	$ 4.95
1.8432	4.95	6.144	4.95
2.0MHz	5.85	6.5536	4.95
2.011MHz	5.85	10.0MHz	4.95
2.09715.2MHz	5.85	13.0MHz	4.95
2.4576MHz	5.85	14.31818	4.95
3.5795/4MHz	1.50	18.0MHz	4.95
4.0MHz	4.95	18.432MHz	5.95
4.19430MHz	5.95	20.0MHz	5.95
4.91520MHz	5.95	22.11584MHz	5.95
5.0MHz	4.95	27.0MHz	5.95
5.0688	4.95	36.0MHz	5.95
5.7143MHz	5.95	48.0MHz	5.95
		100KC	12.95

DISPLAYS/OPTO/LED'S

★ **7 SEGMENT ★ CALC ★ CLOCKS** ★

DL 704 (CC), DL 707 (CA) .300" Red	.99
FND 357 (CC) .357" Red	.99
FND 500/503 (CC) .500" Red	.99
FND 507/510 (CA) .500" Red	.99
FND 560/603/623 (CC) .800" Red	1.75
FND 807/810 (CA) .800" Red	1.75
XAN 3062 .500" Green	1.15
MAN 7602-7731 (CA) .300" Red	.99
9 Digit Bubble Mini Calc. Display	.99
9 Digit Panaplex Display .400"	.99
9 Digit Fluorescent .300"	.99
MA1003 12V Auto Clock Module	**13.95**
Bezel for MA1003 w/Red Filter	3.95
MA1002A LED 12 hr. Clock Module	10.95

★ **HEX DISPLAYS ★ ENCODED DISPLAYS** ★

HP 5082-7340 Red Hexidecimal	15.95
HP 5082-7300 Red Numeric	14.95
TIL 306 Numeric w/Logic	3.95
TIL 308 Number w/Logic	8.95
TIL 309 Number w/Logic	8.95
TIL 311 Hexadecimal	12.95
MAN 2A .320" Red Alpha-Numeric	5.95
MAN 10A .270" Red Alpha-Numeric	8.95

★ **LED's ★ OPTOISOLATERS** ★

LEDS Red, Yellow, Green 185	5/1.00
MCT 2 Photo XSTR HFE 250, 30V	.99
4N25 Photo XSTR HFE 250, 30V	1.29
4N33 Photo Darlington	1.75
FPT 110B Photo XSTR Flat Lense	**SALE** 4/1.00

ATTENTION KIM USERS

KIMSAI-expansion to S-100 ... 125.00 Kit/165.00
KIMSI to KIM Connector 5.75/pair
KIM 1 6502 Single Board Computer 179.00
KIM 1 Power Supply 59.95
KIM Memory Plus - (consists of 8K Ram, 8K2716 Eprom, Programmer, I/O etc.) ... 245.00
KIM SOFTWARE:
- Please package (cassette) 12 games ... 16.95
- Hexip Editor Package (cassette) ... 16.95
- Help Mailing List pkg. (cassette) ... 16.95
- Help Inv. Retrival pkg. (cassette) ... 16.95
- Microchess (cassette) ... 16.95
- Microaid Assembly/Disassem/Editor ... 27.95
- Microaid Source Listing (cassette) ... 27.95
- Tiny Basic for KIM (paper tape) ... 10.95

COMPUTER SPECIALS

WOW!

	LIST	SALE
H-Plot Plotter	1085.00	899.00
H-Plot Digitizer	795.00	735.00
Exidy w/32K	1395.00	1195.00
Sorcerer II w/16K	1195.00	1045.00
Compucolor II w/16K	1695.00	1595.00
TEI PT208 (1 avail.)	4995.00	3995.00
Cromemco Sys III	5990.00	5395.00
Commodore Pet	795.00	765.00
Sorcerer IO/120	995.00	895.00
ADM3A Assem.	895.00	829.00
Teletype 43	1349.00	1150.00
Centronics P-1	495.00	295.00
Centronics S-1	595.00	525.00

MONTHLY IC SPECIALS

LF13508 JFET Anlog Multi 8 bit		8.95
ICM7208 Seven Decade Counter		17.95
ICM7207 Oscillator Controller		6.95
ICM7045 Precision Sto/Watch Timer		22.95
ICL7107 3½ Digit A/D (LED)		14.95
ICL8211 Voltage Reference		1.95
24390 Battery OP Audio Amp		3/1.00
LM1830 Fluid Detector		3/1.00
LM1850 Ground Fault IC		3/1.00
LM1800 Phase Lock Loop FM Stereo		3/1.00
LM1820 AM Radio		3/1.00
DS3625 Dual Mos Sense Amp		2.50
Hi/Rel Prototype Boards	4/19.95	10/47 ECL Ram ... 8.95
1488/1489	2/1.99	NE561 ... 5.00
22 Pin S/T Socket 10/1.00		LF 356H/B-Fet 3/1.99
8T97 Hex Buffer	2.95	MCM14505 3/1.95
6331-1 Prom	1.95	74S89 3/1.99
MK5014 Calc.	2/1.99	74107N 6/1.89
7414	3/1.99	7545ZN 8/1.99
LM2917	2.25	741N-14 10/1.99
8T26/8T28	2.39	555CN 5/1.99
95H90	9.95	556CN 3/1.99

ATTN TRS 80 USERS

★ 20/40 Pin Memory Expansion Conn ... $7.95
★ Add-on Mini-Floppy Complete w/cable ... 395.00
Duals, 795.00, Triple, 1185.00, Quad, 1560.00
Electric Pencil for TRS 80 ... 99.95
★ Custom TRS 80 Modifications. Send for Flyer
TRS 80 Level III BASIC (Microsoft on cassette) 49.95
*TRS 80/Centronics Cable 29.95

SOCKETS

8 Pin W.W. .32	8 Pin S.T .17
14 Pin W.W. .37	14 Pin S.T .20
16 Pin W.W. .38	16 Pin S.T .22
18 Pin W.W. .60	18 Pin S.T .31
20 Pin W.W. .90	20 Pin S.T .34
22 Pin W.W. .93	22 Pin S.T .35
24 Pin W.W. .95	24 Pin S.T .41
28 Pin W.W. 1.15	28 Pin S.T .48
40 Pin W.W. 1.49	40 Pin S.T .63

TEXTOOL ZERO INSERTION FORCE SOCKETS

16 Pin $ 5.50 24 Pin $7.50
40 Pin $10.25

CONNECTORS

DB25P (RS232)	3.25
DB25S Female	3.75
Hood	1.25
Set w/Hood, Sale	$6.50
22/44 W/W, S/T, KIM	2.95
43/86 W/W, S/T, MOT	6.50
50/100 S-100 Connector w/w	4.25
50/100 S-100 Connector s/t	3.25

CTS DIPSWITCHES

CTS206-4 $1.75	CTS206-8 $1.95
CTS206-5 $1.75	CTS206-9 $1.95
CTS206-6 $1.75	CTS206-10 $1.95
CTS206-7 $1.75	

LIVERMORE BASIC

ON 65K ROM
THAT'S RIGHT ON ROM!!!
OUR PRICE only $95.00

NAKED PC BOARD SALE

Z-80 CPU (Ithaca)	$34.95
8080A CPU	34.95
8K Static RAM (Logos)	21.95
16K Static RAM (2114)	29.95
32K Static RAM (2114)	49.95
Floppy I/O (Tarbell)	39.95
Cassette I/O (Tarbell)	29.95
8K Eprom (2708)	21.95
1702 Eprom Board	30.00
2708/2716 Eprom (Ithaca)	34.95
2708/2716 Eprom (WMC)	30.00
Realtime Clock	34.95
ACP Proto Bd (3M Conn.)	27.95
Vector 8800 Proto	19.95
Vector 8803 11 slot MB	29.95
ACP Extender w/Conn.	15.95
Video Interface (SSM)	27.95
Parallel Interface (SSM)	27.95
13 Slot MotherBoard (WMC)	32.95
9 Slot MotherBoard (WMC)	29.95
8 Slot Mother (expandable)	34.95

WAVEFORM GENERATORS

8038 Function Gen	3.95
MC4024 VCO	2.45
LM566 VCO	4.75
XR2206 Function Generator	5.25

FLOPPY DISK I/O

1771-01 8" & Minifloppy	27.95
uPd372 Nec Floppy	49.95
1791 Dual Floppy	39.95
1791 Dual Floppy	44.95

TV INTERFACES

Pixie-Verter	8.50
TV-1 Video Interface	8.95
Microverter	35.00
M&R Modulator	35.00

ATTENTION PET USERS

BETSI-pet expansion to $100
..... 105.00 Kit/160.00
PET Connector Kit. Includes (4) Connectors for memory expansion, IEEE 488 I/O, cassette I/O and parallel user port 7.95/set
Video Buffer
(converts to Std. Video) 29.95
Petunia (Music Board) 29.95
Combo (Video & Petunia) 49.95
Beeper (signals tape load) 24.95

ATTENTION APPLE II USERS

Apple II w/16K	$1045.00
16K Upgrade Kit	89.95
Floppy Disk II w/Interface	595.00
Floppy Disk II	495.00
Firmware Card	160.00
Printer Centronics P-1 w/cont	595.00
Printer Centronics P-1	395.00
Printer Centr 779 w/cont	1445.00
Apple II Proto Board	24.00
Parallel I/O Card	180.00
Communications I/O Card	180.00
Coresident Assembler/Cass	19.95
Heuristics Robot Car	249.00
Heuristics 20A Speechlab	189.00
Dow Jones Stock Quote Pkg.	25.00
AJ-A242 Coupler	325.00
I/O to transmit over existing wiring	189.00 A/T
★ Trencom w/IO 40 col. printer	$406.00
★ Lower case adapter	49.95

TV CHIPS

AY-3-8500-1 8 Games Color ★ 8515	$8.95
AY-3-8500-1 8 Games B/W	4.95
AY-3-8515 Color Converter	2.95
AY-3-8503-1 Roadrace Game	8.95
AY-3-8605-1 Warfare Game	9.50
AY-3-8506-1 Wipeout Game	9.50
AY-3-8507-1 Shooting Gallery	9.95
AY-3-8610-1 10 Games Color ★ 8615	9.50
AY-3-8615 Color Converter	4.95
AY-3-8910 Games Clock Sound Generator	12.95
SN76477 TI Sound Generator	2.95
MM5-320-21 TV Sync Gen	9.95
MM5-369 Prescaler	3.95
LM1889 RF Modulator	3.95
MM5-1100 NSC Color TV Game	4.95
MM5-7124 Clock Gen	3.75
RF Modulator & Audio	4.95

All Shipments FOB or UPS. Orders under $100.00 add 5% handling and postage. Orders over $100.00 add 2% handling & postage. Mastercharge/Bankamericard/COD accepted w/25% deposit. California Residents add 6% tax. Foreign Orders add 8% handling. All parts prime factory tested guaranteed. Same day shipment. Add 35 cents for Data.
Retail pricing may vary from Mail Order Pricing. All pricing subject to change without notice.

P. O. BOX 17329 Irvine, California 92713 Phone (714) 558-8813 TWX: 910-595-1565

Retail Store Open Mon. – Sat.
Located at 1310 "B" E. Edinger,
Santa Ana, CA 92705

CIRCLE 116 ON READER SERVICE CARD

We shop for a personal computer

Mystery Shopper

In today's world children battle at challenging electronic games, while universities across the country are reporting all-time high enrollments for computer related courses. And, we are just beginning to realize the full potential of the computer. Scientists predict that by 1982, the U.S. market for home computers will reach 630,000. — Source: Creative Strategies.

The future will put microprocessor based TV's, hifi systems, games, information systems, and many more products into the hands of the average consumer who today knows very little about computers. In fact, the day is fast approaching when many of these consumers will be invading those previously untouched citadels known to computer buffs only... retail computer stores.

CONSUMER ELECTRONICS magazine has been running a "Mystery Shopper" series for several years in which a "typical" shopper visits several retail stores to buy an auto stereo, tape deck or other consumer electronics product. Borrowing on this format and recognizing the personal computing explosion and evolution, we at CREATIVE COMPUTING sent our own mystery consumer to a number of retail computer stores to catch a glimpse of what the innocent consumer can expect as he/she attempts to buy His/her first home computer.

This is her story.

The first store I decided to visit was Computer mart located in Iselin, NJ. As I walked into the store, a smiling salesman immediately approached me.

"May I help you?"

"Yes," I said rather hesitantly. I was feeling intimidated by everything in the store and the saleman's eagerness.

"I'm looking for a computer that my husband and I could use at home. We've been impressed by our neighbor's computer and thought we might look into buying one for ourselves. I really don't know much about them though. Which computer would be the best for us?"

"First, let's get to know each other. My name is Gary. What's your name?"

"Gail," I replied, wondering the whole time if all computer salesmen were going to be this friendly and want to know my first name!

In the midst of my musing, Gary burst in with the sales pitch.

"Gail, I want you to take a close look at both of these computers. I'll be totally honest with you," he said, pointing out the Exidy Sorcerer and the Apple. "They're our best-selling home computers. They are inexpensive, only about $1,000. They have 16K of memory and both can be expanded."

"What's the difference? Is one better than the other?" I inquired.

"They're pretty comparable," he said.

"Which would you recommend?"

"Well, we don't expect to have the Sorcerer for another two months," he explained apologetically. "You see, it's relatively new, and we haven't received our shipment yet."

Since he had successfully limited my choice to the Apple, I inquired about the PET.

"We don't carry the PET, but let me warn you about it," he cautioned. "You have no color with the PET. It also has no expansion capability and the keyboard has severe limitations."

"In what way?" I asked.

"Well, it has a calculator-type keyboard where as the Apple has a keyboard that's very similar to your typewriter. I think you'll be more comfortable with the Apple," he explained, smiling the entire time.

The only thing I could really learn from Gary was that he had the Apple in stock and was only willing to push it. I asked him to give me some pamphlets and any other information he might have and decided to go to another store.

Next on my computer shopping list was Hoboken Computer Works in Hoboken, NJ. This store was a striking contrast to the store in Iselin. I was able to browse for ten minutes or so before a salesman approached me.

"My husband and I want to buy a home computer," I ventured.

"What do you want to use it for?" he asked.

"Oh, I think we are mostly interested in its entertainment value at the present. But, I suppose my husband will want to do his bookkeeping and things like that on it, maybe even taxes, some time in the future. Maybe our kids could use it too."

The saleman hurriedly rattled off some information to me, sounding more like a recording than a person. He handed me all sorts of booklets, pamphlets, fliers and pictures as he was ushering me around the store pointing out the various computers. A low-key, or maybe I should say, no real sales pitch and before I realized it, I was out the door!

After those two experiences, I decided I would wait until the next day to visit any more stores. So, early the next morning, I journeyed to Radio Shack in Morristown, N.J.

"What can I do for you?" the salesman asked.

"I'm looking for a home computer for my parents," I explained. I thought if I changed my story a little bit, I might learn more than I had the first day.

"We only carry the TRS-80. Does your father own a soldering gun or a keyboard?"

"Why? A soldering gun...."

"What I mean is, does your father want to build a kit or just use one for entertainment?"

"I really think my father would just like it for entertainment. Could you tell me the difference between the TRS-80 and other computers? Like the Apple and the PET?"

"Everyone hates the PET," he assured me. "It just isn't standard, the typing is very difficult and accessories for it aren't available."

"But, I had heard from a friend that with a PET you could get accessories for it."

"Well, maybe, but it takes too long to get them and they're not reliable."

"What about the Apple?" I asked.

"The Apple is better as a TV game. But the TRS-80 is different. It has a better language than the Apple," the salesman insisted.

The salesman continued by telling me technical things about the TRS-80, about its "40-pin bus" and all sorts of technical jargon. I tried to interrupt, but he quipped "your father will know what I mean."

"Just write this down," he commanded. "Level-II BASIC, 16K RAM - $1,000. Level-II BASIC, 4K RAM-$700. Do you want to play a game?"

I nodded and we walked over to the one TRS-80 on the counter.

"Do you know what Klingons are?"

"Of course," I replied somewhat sarcastically. Doesn't everyone know about Klingons?

The salesman quickly explained the game to me and rushed off to answer the phone.

In a matter of seconds, I had managed to get the Enterprise in a state of Red Alert and the Klingons were ready to take over the galaxy.

"Look what you've done," screamed the salesman. "I'll never beat them now."

The salesman was taking his job much too seriously, I think.

Next on my list was Computerland, also in Morristown. Surprise — a young woman salesperson approached me. After explaining what I wanted, I was given the same promotional material that I had received from Computer Mart.

"All of the information is in this book," she said, choosing a brightly covered book. "If you have any questions, just ask."

"What kind of expansion capabilities does the Apple have?" I asked showing off my newly-acquired knowledge.

"There are eight interface card slots right on the circuit board," she explained. "When you start feeling limited, you can add on to it."

"Would you like a demonstration of what the computer can do?" she asked.

A stocky well-dressed man sitting in the shop interrupted, "Let me show her."

"I don't work here," he informed me. "But I love playing with these toys! I've been coming in here so much that they even bought me my own coffee mug... see," he said, holding up his gift for me to admire.

"One day soon, I'm going to buy a god-damn computer," he laughed, winking at the salesperson. "I love the Apple."

From further conversation with the salesperson, and the man attempting to be the salesperson, I learned:

1. He was an insurance man with a passion for computers.

2. He was an outspoken opponent of Radio Shack.

"How does the Apple compare with the TRS-80," I asked, innocently.

"You wouldn't want to buy a computer from Radio Shack," he said with a look of disgust. "Those guys are robots. They know nothing about computers."

Thinking back to the salesman at Radio Shack and his aversion to the PET, I wondered whether I was getting unbiased advice.

"Pricewise, how do they compare?" I asked.

"I can tell you that. I checked out the prices, and we're cheaper," the insurance man bragged, as if the store was his own. "Plus, they take 90 days to deliver," he continued.

At this point, the owner came over and renewed my faith in computer salesmen. He demonstrated some unique capabilities of the Apple and allowed me to try some easy

Shopper, con't....

programs and games. He explained the language of the computer in layman's terms and I was able to understand what he meant by "memory options" and "disk systems."

I left with a good feeling towards computer salesmen.

Last on my list, was Computer Nook, on Route 46 in Pinebrook, N.J. I had come across a coupon in a local paper advertising this store as the "Only Authorized PET dealer in N.J." "Bring the family" the coupon read. "The uses in your home or office are limited only by your imagination."

The store was the most impressive one I'd seen. White vinyl chairs with silver chrome were scattered around the room. It was obvious that they encouraged customers to play with the computers.

Once again, a salesman approached me, and I told him what I was looking for.

"Sit down with Bob, he knows more than me," the salesman said.

Bob explained the store's emphasis on the PET. "It's a cheaper, more compact, and better designed, with a built in recorder and screen. The keyboard is compact, but it's not hard to learn," he explained.

"My daughters play with the PET all the time, and they really enjoy it," he said (to exemplify the simple task of switching to a non-typewriter type keyboard.)

Since he carried both machines, he also said that I could buy the PET and trade if for the Apple if I wasn't satisfied.

"Are there games available for these computers?" I inquired.

There's a huge selection of games for both the PET and the Apple. We don't have them copied yet, but we will," he assured me.

"After I buy a computer, are the prices going to go down drastically, like the situation with the calculator?" I asked.

"Well, there has been that tendency," he admitted. "The price has really dropped in the last two years, but now prices are starting to level off and even go up again. It's the demand theory in action. Take the Imsai for instance. It was selling at $1000 and now it's slightly higher. The retailers are saying 'Why should we sell computers for this price when we can get this for them" he said quite honestly.

"The tape market is going to get very competitive," he continued. "People all over the place are making tapes for the various computers. If you own a computer, you don't even have to know how to program. You can just purchase these tapes which in many cases are very complicated programs.

He then showed me some tapes on record-keeping and balancing a checkbook. We spent a lot of time on the PET, but only after I left, did I notice that I wasn't really pushed toward the Apple. At this point, I was feeling very kindly towards low-pressure salesmen.

During several visits to computer stores in Maryland, Washington, D.C., and Virginia. I had very similar experiences. I guess my conclusions are that you can learn something about the booming computer arena, if you visit several stores, ask the right questions, and are willing to spend some time with the salespeople.

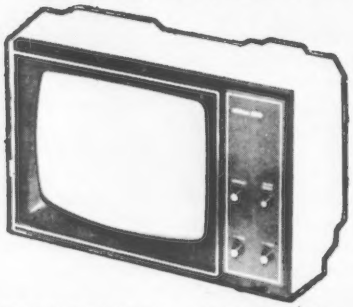
Reading the literature and magazine evaluations, and talking to knowlegeable friends helps too. But don't depend upon a single source to make your buying decision or you may be disappointed. □

[Creative's Mystery Shopper on this shopping trip was Patty Rust. Since the article was written, Bob Radcliffe of Hoboken Computer works has gone exclusively into system design and S-100 hardware repair and is no longer operating a retail store. All the other stores that we visited are alive and, hopefully, flourishing.]

THE PERFECT COMBINATION

$139.00

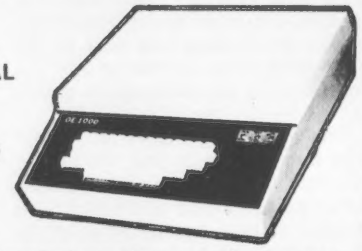
VIDEO 100 MONITOR



The Video 100 is designed to meet your monitor needs for both personal and business use. It is compatible with a wide range of computer systems, and with a bandwidth of 12 MHz it is capable of displaying up to 80 characters per line on this 12" B/W CRT. The solid state circuitry assures a stable & sharp display. The front panel controls include power, contrast, horizontal and vertical holds. Adjustments for height, vertical linearity, and width control are located on a rear panel. All the above features for only $139.00.

OE 1000 VIDEO TERMINAL

$275.00



The OE 1000 Video Terminal provides you with a low cost means to communicate with your computer. The OE 1000 will display 16 lines of 64 characters on a monitor or modified TV. The terminal will generate and display the full 96 ASCII character set (upper and lower case) plus 32 special characters (Greek letters and math symbols). The terminal will also erase to end of line, erase to end of screen, scroll, and it has full X-Y cursor movement. Interfacing to your computer requires a full duplex, serial, RS232 or 20 mA loop I/O port at the rate of 110 or 300 baud. The OE 1000 sells for $350 assembled or $275 in kit form.

Master Charge, Visa, accepted. COD Extra. Add $5 per unit, $10 both units, shipping handling insurance.

The perfect low cost combination of the OE 1000 and Video 100 are available from

OTTO ELECTRONICS

PO BOX 3066, PRINCETON, NJ. 08540 or call (609) 448-9165

CIRCLE 173 ON READER SERVICE CARD

THE SEARCH FOR A SMALL COMPUTER SYSTEM STARTS HERE

It's the 3rd Annual National Small Computer Show,

presenting the state-of-the-art showcase for micro- and mini-systems technology and software. Here you can survey virtually all makes and models of small computers, whether your interest runs to a no-nonsense micro priced in the hundreds of dollars or a powerful mini costing $20,000 or more. They're all here.

The world of small computers is quite large, extending to business and professional offices, scientific research, medicine and bionics, education, the home and hobbyist, therapeutic applications for the handicapped, design and engineering.

A full selection of lectures is presented to provide a grasp of small systems technology, so that you know what to consider when buying a computer or word processor. It's the first step in discovering what a system can really do for you!

NSCS lectures include sessions on system selection, computer languages, word processing functions, artificial intelligence, software applications, and a dozen more topics for people of all interests.

Plan now to attend. There will be about 30,000 square feet of exhibits, and more than 40 hours of lectures from which to choose. Registration fee is only $5.00 per day, including lectures.

Write for our informational brochure from National Small Computer Show, 110 Charlotte Place, Englewood Cliffs, N.J. 07632.

THIRD ANNUAL NATIONAL SMALL COMPUTER SHOW, New York Coliseum, August 23-26, 1979.

An Experiment In Small Business Computing

Part II: Billing program and its operation

Ken Barbier

Can your business be run using the "canned" applications programs available or will you be better off taking the "customized" approach described here?

In Part 1 of this series we described an experiment designed to determine whether or not an expenditure of under $2000 in hardware could provide enough computing power for a small store to justify the investment. That article detailed the selection of the hardware system components, based on the Sorcerer computer. As we discussed then, one constraint of the experiment was that the system could not interfere with or drastically modify the manual procedures already in use in the store. This precluded the purchase of an off-the-shelf accounting system.

We still feel strongly that the prepackaged software systems are not being accepted by a lot of small businessmen simply because they dictate to him how he must operate his accounting system. The millions of Mom and Pop type stores which could afford a small computer, and who need it to relieve them of some of the repetitive tasks better handled by a machine, are not using the fine systems now available because of their reluctance to abandon the habits of a lifetime.

Owned and operated by Randy and Betty Townsend, the Borrego Hardware Company, in Borrego Springs, California, is just such a small business. It has a large proportion of charge account customers for a retail store of its size, which makes the monthly billing of charge account customers the most labor intensive of the store's accounting procedures. The computerization of the billing provided an ideal initial experiment to establish whether or not our minimum hardware configuration could earn its keep.

Since we were not going to acquire a complete accounting system, the first task was to define the initial task to be automated. The selection of the billing operation was obvious in this instance, as it was the most time-consuming operation, and the money doesn't come in until the statements go out.

This task may not be the most pressing for every business. If all computer users had the same requirements there would probably be an off-the-shelf computer with application programming in read-only memory already available in computer stores from coast to coast. It is because requirements and procedures are so

Ken Barbier, Borrego Engineering, PO Box 1253, Borrego Springs, CA 92004.

varied that this obvious solution has not yet been implemented.

Since such an easy solution was not at hand, our first task was to specify what hardware would be required, and get some feel for the data requirements so that we could anticipate throughput time. As mentioned last month, we needed a system with at least two tape drives, a printer, keyboard and video display. Even though the cost was somewhat higher than the competition, the Sorcerer computer was our first choice because of its superior array of built-in interfacing capabilities.

As our budget did not provide for a disc system, two casette tape decks are the minimum required for our account data handling. The Sorcerer has the interfaces for both tape decks, including motor on-off controls.

Next we had to define what each customer's account record would include. Here the quantity of data to be contained in each record had to be minimized in order to provide a reasonable throughput rate. The Sorcerer has plenty of memory to handle the data arrays, but the tape data transfer rate is snail-like.

Figure 1 shows the format of the customer account record. Once again, we were governed in our selection of what data to retain on tape by the way things had been done in the past, on paper. Absolute compatibility was a prerequisite, at least initially. This dictated that the first version of the billing program would simply automate the procedures already in use.

After the first month's run, Betty was quick to ask "Next month, couldn't we add. . . . ?"

This question exemplifies the amateurish manner in which we were doing things. We did not sit down in advance and determine in detail all the characteristics of the final system. This may not be good "systems analysis," but it made good sense in this experiment, because we were not really sure what we wanted when the project began. Therefore, we preserved compatibility and flexibility, at the expense of programming time invested.

The data to be input by the operator as each record is processed was previously known, of course. Daily charges are added to an open-ended invoice as each purchase is made. Only at the end of the month are totals figured for the taxable charges, nontaxable charges and sales tax. To avoid multiple runs with our slow, sequential access tapes, payments received during the month are also posted at the end of the month. Once again, these procedures are not standard practice, but "that's the way it's always been done." So that is the way we did it.

The Customer Account Record

Most of the data items in Figure 1 are self-explanatory. Since the version of BASIC supplied with the Sorcerer has no provision for writing alphabetic (string) data to tape, such data has to be converted to numeric data before it can be recorded, so the distinction between data types "A" and "N" must always be kept in mind by the programmer. The "last payment" date and "last charge" date are updated in any month in which the account has such activity, to provide a means of detecting aged accounts. Some space has been left over in the records for future expansion, so that the record size need not be changed as more features are added. The record number is the last item in the data array; it is checked as each record is read in from tape. If the record number does not show an increment of one as each account is read in turn, the operator is warned that a read error may have occurred, and is given the option of re-reading the record.

Billing System Programs

Table 1 lists the four programs which are components of the billing system. Initially a data base had to be created on tape with a record for each active charge account customer. CREAT is the program which was used to perform this task. Additionally, as new accounts are added to the data base, CREAT is used to generate a "New Accounts" tape.

Computer operator Cynthia Barling makes full use of the Sorcerer computer's numeric keypad in entering data in response to the billing program prompts displayed on the video monitor.

As there is always a rush to get out the statements at the first of each month, the New Accounts are processed separately from the "Old Accounts" tape. Only after both tapes are processed by the RUN program, (and statements are in the mail) are the two sets of data merged into a single ordered data base by the MERGE program.

Following the merge, LIST is called to provide a printout summarizing the month's activity of both the old and new accounts, now combined in alphabetical order.

It must be kept in mind that the tapes are sequentially accessed, and that there are only two tape decks. This requires that the initial data base had to have been in alphabetical order when CREAT was first run, and that new accounts to be added monthly must be a similarly ordered set. These requirements posed no disruption of the existing manual procedures, since such alphabeticising is usual in manual systems anyway.

The merge program seemed on the surface to require the use of a third tape deck, or some random access storage for the new accounts to permit them to be inserted into their proper place in the main data base. Since we are dealing here with a few hundred records, total, and only a few tens of records to be added each month, it was feasible to read the new account records into the computer's random access memory, and insert them into their proper place on the output tape as the old account tape is read from the input tape.

The alternative to this inelegant solution is, of course, a disc system. As our experimental budget did not provide for such a luxury, we worked our way around the problem as best we could. The resulting operation is not as inconvenient as might be supposed.

Billing System Operation

The operation of CREAT is straightforward. A blank tape is placed in drive 1 and the program asks the operator for the current date and the initial output record number desired. The actual record number is unimportant, except that the program "knows" how many records will fit on each side of a casette, and if the initial number is one it will prompt the operator to change the tape at the proper time. This holds true for all the other programs as well.

With this initializing data stored, the program will then ask the operator to enter "Account number," "Name," "Address," etc., in turn, and when all the data has been entered, will ask "All OK?" before writing the account record on the tape.

This sequence of prompt, response and verify is used throughout all the programs which require operator intervention. The operator is always given the option of correcting an entry, even after the carriage return has been entered. In addition, use is made of the "home cursor" character so that each prompt appears on the same part of

Billing, con't....

the screen for each new record entered.

One convenience included in CREAT is the storage of the local city, state, and zip code, so that the operator can respond to the prompt "City" with a single character "*" for local addresses.

The RUN program is the most complicated as far as operator action is concerned. Photo 2 shows the screen display at the beginning of each RUN. The current version of the program is displayed, along with its creation date. We started with RUN, which had to be revised to NURUN, which needed corrections producing NEWER, which was upgraded to NEWST. Where do we go from here?

Abbreviated instructions tell the operator to place the input tape in drive 1 and select READ (or "PLAY" as on most cassette decks), and place a blank tape in drive 2 to be recorded onto. We will discuss the "T=1?" under System Problems, below.

Once again the operator is asked to select an output record number. If RUN is restarted with the output tape partially filled, this number may not be "1" so the option is allowed. When the operator is asked for the current date, the cursor is positioned under the initial "M" in the "MM DD YY" field to insure that the usual commercial (as opposed to scientific or military) method of specifying dates is followed. The "10 23 78" thus entered will be compressed into the string "102378" and stored in each account array in locations 0 through 5 (Fig. 1).

Thus initialized, the RUN program will read the first record from tape 1 and display what it finds as shown in Photo 3. This picture shows that RUN encountered an initial *input* record number of 120, but will change this to the requested number when the output record is written. We see that the fictitious Mr. Barlkrum has no account history (blanks in the date field for last payment and last charge) but a balance owing of $222.22. This would be a normal display for a record from the New Accounts tape.

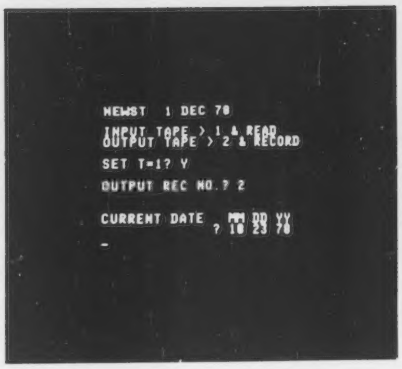


Photo 2.
The RUN program has been loaded and needs to be initialized by data entered in response to the operator prompts displayed.

Photo 3.
A customer account record has been read in from cassette tape number one. The operator is given four processing options to select from at this point, as explained in the text.

The operator is then asked if this account has any current activity, and has four options he may enter:

"Y" = "Yes, lets process this account."
"R" = "Re-read this record, something is wrong."
"W" = "Write it out as is, no activity this month."
"D" = "Delete this record, the account is inactive."

Any other response will result in a redisplay of the same prompt.

As we can see from Photo 4, the operator responded "Y." He was then given the option of correcting any error in the most important data, the money part.

Having determined from a glance at last month's LIST printout that the previous balance is correct, the operator proceeded to enter as many payments as were made (terminating with a zero entry), taxable charges and non-taxable charges. When a zero entry signals the last input, RUN provides the summary of the account activity and computes the sales tax and closing balance.

Once again the operator has the option of entering "N" to reject the data as displayed, which would return him to the step shown in Photo 3. A "Y" at this point would result in the display of Photo 5. Here we see that the *output* record number is at the top of the display. With the exception of the bottom line this display is an image of the statement which will be printed. Figure 2 is a sample of such a printed statement.

The bottom line is a summary total of the numeric values in the records processed to this point, which was requested by the Chief Bookkeeper, Betty, and was added to the RUN

NAME	Description.
CREATE	Generates a "New Accounts" tape consisting of new charge customer account records, which must be entered in alphabetical order.
MERGE	Merges the account records from the New Accounts tape into the "Old Accounts" tape in alphabetical order.
RUN	End-of-month billing run. Displays account record, accepts payments and charges, calculates sales tax and closing balance. Writes updated account record tape and prints statement. Accumulates and displays totals.
LIST	Prints a summary of the updated account record tape, one account per line (name field is abbreviated). Shows each account's payments, charges, tax, and closing balance for the month. Accumulates and prints totals.

Table 1.
A brief description of the functions of each of the programs making up the billing system.

INDEX	SIZE	TYPE	DATA	LABEL
0-5	6	A	Current date (MMDDYY)	
6	1	N	Account number	AN
7-26	20	A	Last name	
27-36	10	A	First name	
37-56	20	A	Address	
57-71	15	A	City	
72-73	2	A	State	
74	1	N	Zip Code	ZP
75	1	N	Previous balance	PB
76-81	6	A	Last payment date (MMDDYY)	
82-87	6	A	Last charge date (MMDDYY)	
88	1	N	Payments*	PT
89	1	N	Taxable charges*	CT
90	1	N	Non-taxable charges*	CN
91	1	N	Sales tax*	ST
92	1	N	Closing balance	BC
93-108	16	N	Future expansion space	
109	1	N	Record number	RN

Data type: A = alphabetic N = numeric
*Total for current month

Figure 1.
Customer Account Record.

BORREGO HARDWARE CO.
652 Palm Canyon Drive P.O. Box 725
Borrego Springs, Ca. 92004
Phone 767-5310

13 11/02/78

GRAMICA CHIZMADEY
P O BOX 12
SWEARY SPRINGS, CA 92034

PREVIOUS BALANCE 43.12
TOTAL PAYMENTS -
NEW BALANCE 43.12

TAXABLE CHARGES 456.73
SALES TAX 27.4
NON-TAXABLE CHARGES 200.99

CLOSING BALANCE 728.29

STATEMENT

Figure 2.
The most visible end result of the billing program: the printed statement. The updated account record is also written out on cassette tape number two.

Photo 4.
Payments and charges have been entered by the operator, and the RUN program asks if the entries and its computation of tax and closing balance are acceptable to the operator.

Photo 5.
An image of the statement to be printed is displayed, along with cumulative totals for the numeric values handled by the billing program.

program at its last update. We will have to add headings for those values at the next program update.

RUN proceeds to write out the updated account record on tape 2 and prints the statement on the printer connected to the Sorcerer's parallel port. The next account record is then read in from tape 1, and the process continues.

System Problems

The hardware selected for this inexpensive system has proved to be as reliable as could be expected. The weakest link in the hardware system is in the tape cassettes themselves. As many others have discovered, cheap tape is no bargain.

Anticipating an occasional loss of data due to tape imperfections, I had originally programmed the system to write out each data record twice. This would permit the operator to call for a reread in the event of an obvious data error. All the programs were set up to reread on a record number sequence error, and would complain to the operator only when both reads were in error.

This technique would have been satisfactory except for the major problem encountered in implementing the system. After we were committed to the experiment, I discovered that data arrays as written to tape by the BASIC language statement "CSAVE*" would not read reliably at the high tape density (1200 bps). Programs themselves are saved and loaded reliably at high density, but this is not true for the operations involving data arrays. Slowing the tape data rate by a factor of four (300 bps) provides reliable array operation. This requires entering the Monitor directive "SET T=1" (see Photo 2). This problem was reported in detail to Exidy, Inc., the manufacturer of the Sorcerer, some time ago, but no reply has yet been received.

The necessity for operating at the slower tape data rate threw my initial throughput estimates off by a factor of four, but was not the only underestimate I made. Since a large part of the account record is alphabetic, and "string arrays" are not permitted by the Sorcerer's BASIC, the alpha data has to be converted to numeric data to be saved and loaded. The conversion is done quite rapidly in BASIC, but results in an expansion of data by another factor of four! It takes four bytes of memory to store each number

The S S I Microcomputer Software Guide

Over 2300 programs on tape, disk, published in books and magazines from 130 software sources (with addresses), classified into 230 categories with cross-references.
Shipped off the shelf.

Second Edition $ 7.95

A Companion to Uiterwyk's BASIC Interpreters by Dave Gardner

70 key memory locations mapped in SWTPC/MSI BASICS plus 30 assembled 6800 routines for ON ERROR GOTO, digit justification, IF THEN ELSE, program length, memory dump and more! With this book you can alter your Uiterwyk BASIC.
Shipped off the shelf.

Second Printing $ 14.95

6800 FLEX™/SWTPC Software

- **Renumbering System by Dave Degler**

  Renumber your BASIC programs with this new FLEX™ utility. You'll wish you had it if you paint yourself into programming "corners". Needs no extra RAM beyond the program being renumbered. With operation notes. Available on FLEX™ minifloppy disk or SWTPC KCS cassette.

- **Some Common Basic Programs by Lon Poole and Mary Borchers**

  Now adapted to FLEX™ and SWTPC 8K BASICS!
  67 key programs from the popular book, which is necessary as the manual. Conversion notes included.
  Disk 1: 37 programs on finance, investments, mortgage amortization, plotting, intergration, more.
  Disk 2: 30 programs on matrix arithmetic, statistics, calendar dates, metrics, more.
  Available on FLEX™ minifloppy disk or SWTPC 8K KCS cassettes.
  The book, Some Common Basic Programs – $ 8.50

- **Weekly Payroll / Income Expense Ledger / Club's Mailing List / Church Membership and Pledge Records by Roger L. Smith**

  These BASIC programs have had years of use and will be valuable additions to your SWTPC software library. Operation notes included. Cassette editions store data on data tapes. Each program is on one FLEX™ minifloppy disk or SWTPC 8K KCS cassette.

  Prices: FLEX™ minifloppy disk $ 16.95 each
  Kansas City Standard SWTPC 8K BASICS Cassette $ 10.95 each

All software shipped off the shelf. Please include check or money order. International: add $ 4.00 per item for air mail postage. U.S. First Class: add $ 2.00.

S S I Publications

4327 East Grove / Phoenix, Arizona 85040

* Distributed to dealers by MICROMEDIA Marketing, 800-423-4265
See us at the COMPUTER FAIRE, booth 423 in San Francisco, May 11-13

FLEX™ is a trademark of Technical Systems Consultants, Inc.

CIRCLE 179 ON READER SERVICE CARD

Billing, con't....

in an array, and since each character converts to one number, it takes four times as much memory space to store a string thus converted. Which would be no problem if it didn't take four times as long to read or write to the already slow cassette tapes.

After a couple of runs through the billing system programs, Betty decided that she would rather have the occasional tape errors than put up with the slow tape operation. So we dropped the second copy of each record. This would not have been necessary, had the tape operations been reliable at 1200 bps.

Conclusions

Randy and Betty are happy with their billing system. What more can you say?

Well, you can do a real cost analysis to see if the system is truly earning its keep. The only way to put a dollar value on what the computer produces is to evaluate the time saved. Betty estimates that the billing is now done in one third the time. Multiply her hours saved per year times a reasonable hourly wage for clerical help, and subtract the "lost income" that a $2000 investment represents, and you find that it will take two years for the Sorcerer system to pay for itself.

But what about the cost of the software? Since these programs were custom designed from the ground up, and no use was made of prior art, it would take another year of Betty's saved time to pay for even this simple program package. What this means is that the pre-packaged accounting software systems for small computers which are readily available today at moderate cost represent the greatest bargain in the history of data processing. If you are willing to adapt to their way of doing things. If you insist on a custom system, as we did, it will cost you many times more.

But it is impossible to put a dollar value on the convenience that this system represents. And, of course, it has just begun to take over the many jobs around the store that it is quite capable of handling.

As far as the statement of our original experiment is concerned, the hardest look at the economics of the system shows that, even with paying for the custom software development at inflated rates, the system will pay for itself in a few years of performing this one task alone.

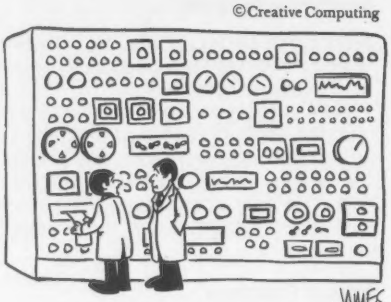
Recommendations

If you enjoy problem solving, and have time to kill on long winter evenings, you would have trouble finding a more rewarding "hobby" than developing your own business computer system and writing your own customized software. Even if you go no farther than automating a simple task like we have done, a system like this can actually pay for itself in your business. And of course, that "hobby" is business in the eyes of the IRS.

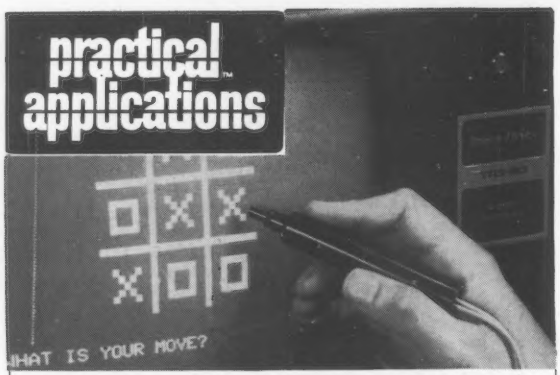
If you want the maximum return on your dollar invested, and don't mind the higher initial cost, then the $5,000 to $15,000 systems readily available with excellent small business software packages are the way to go.

But if you take that route, you won't have as much fun as we did! ■

©Creative Computing



"Yes and no."



LIGHT-PEN FOR YOUR TRS-80

PLUGS RIGHT IN! Exclusive design includes two sample programs and complete documentation so you can write your own programs in Basic. Long life from standard 9-volt battery. **Low-priced at only $19.95!**

PRACTICAL APPLICATIONS™ (415) 573-8217
Post Office Box 4139, Foster City, CA 94404

☐ Please send me _____ TRS-80 Light Pens ($19.95 each enclosed. Calif. residents add tax).

☐ Send your catalogs.

Name_____

Address_____

City_____ State_____ Zip_____

TRS-80 is a trademark of Tandy Corp. CC679

CIRCLE 176 ON READER SERVICE CARD

Micro Business Software

CMBS© by Computer Products of America

- Complete interactive, double entry accounting
- 46 programs with extensive software
- Written in Northstar BASIC (other variations available)
- General ledger, accounts receivable, accounts payable, inventory and payroll
- Three minidisks for transaction, data and maintenance
- Diskettes hold 500 customer listings, 800 vendors, 1500 line items of inventory, 500 employees, 125 general ledger accounts
- Only $395.00

To order **CMBS©** *business software, send check, money order or purchase order (Calif. residents add 6% sales tax—prepaid orders shipped at no charge) to:*

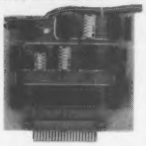
Computer Products Of America
A Division of The Computer Mart
633 West Katella Avenue
Orange, CA 92667
(714) 633-1222

Dealer and OEM prices upon request

CIRCLE 131 ON READER SERVICE CARD

TRS-80 E.S. SERIAL I/O

• Can input into basic • Can use LLIST and LPRINT to output, or output continuously • RS-232 compatible • Can be used with or without the expansion bus • On board switch selectable baud rates of 110, 150, 300, 600, 1200, 2400, parity or no parity odd or even, 5 to 8 data bits, and 1 or 2 stop bits. D.T.R. line • Requires +5, -12 VDC • Board only $19.95 Part No. 8010, with parts $59.95 Part No. 8010A, assembled $79.95 Part No. 8010 C. No connectors provided, see below.



EIA/RS-232 connector Part No. DB25P $6.00, with 9', 8 conductor cable $10.95 Part No. DB25P9.

3' ribbon cable with attached connectors to fit TRS-80 and our serial board $19.95 Part No. 3CAB40.

MODEM✲

• Type 103 • Full or half duplex • Works up to 300 baud • Originate or Answer • No coils, only low cost components • TTL input and output-serial • Connect 8 Ω speaker and crystal mic. directly to board • Uses XR FSK demodulator • Requires +5 volts • Board only $7.60 Part No. 109, with parts $27.50 Part No. 109A

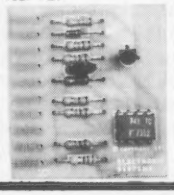
VERBATIM MINIDISK

Box of 10

$29.95

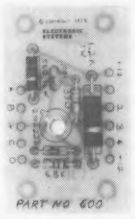
RS-232/TTL✲ INTERFACE

• Converts TTL to RS-232, and converts RS-232 to TTL • Two separate circuits • Requires -12 and +12 volts • All connections go to a 10 pin gold plated edge connector • Board only $4.50 Part No. 232, with parts $7.00 Part No. 232A 10 Pin edge connector $3.00 Part No. 10P



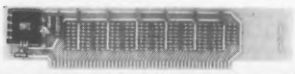
RS-232/TTY✲ INTERFACE

• Converts RS-232 to 20mA current loop, and 20mA current loop to RS-232 • Two separate circuits • Requires +12 and -12 volts • Board only $4.50 Part No. 600, with parts $7.00 Part No. 600A

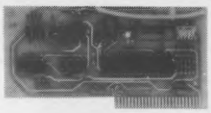


S-100 BUS ✲ ACTIVE TERMINATOR

Board only $14.95 Part No. 900, with parts $24.95 Part No. 900A



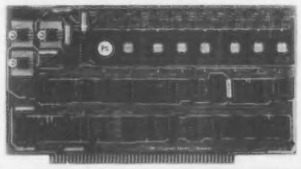
APPLE II✲ SERIAL I/O INTERFACE



Baud rate is continuously adjustable from 0 to 30,000 • Plugs into any peripheral connector • Low current drain. RS-232 input and output • On board switch selectable 5 to 8 data bits, 1 or 2 stop bits, and parity or no parity either odd or even • Jumper selectable address • SOFTWARE • Input and Output routine from monitor or BASIC to teletype or other serial printer • Program for using an Apple II for a video or an intelligent terminal. Also can output in correspondence code to interface with some selectrics. • Also watches DTR • Board only $15.00 Part No. 2, with parts $42.00 Part No. 2A, assembled $62.00 Part No. 2C

8K EPROM PIICEON

Saves programs on PROM permanently (until erased via UV light) up to 8K bytes. Programs may be directly run from the program saver such as fixed routines or assemblers. • S-100 bus compatible • Room for 8K bytes of EPROM non-volatile memory (2708's). • On-board PROM programming • Address relocation of each 4K of memory to any 4K boundary within 64K • Power on jump and reset jump option for "turnkey" systems and computers without a front panel • Program saver software available • Solder mask both sides • Full silkscreen for easy assembly. Program saver software in 1 2708 EPROM $25. Bare board $35 including custom coil, board with parts but no EPROMS $139, with 4 EPROMS $179, with 8 EPROMS $219.



WAMECO INC.

FDC-1 FLOPPY CONTROLLER BOARD will drive shugart, pertek, remic 5" & 8" drives up to 8 drives, on board PROM with power boot up, will operate with CPM (not included). PCBD $42.95

FPB-1 Front Panel. (Finally) AMSAI size hex displays. Byte or instruction single step. PCBD $42.95

MEM-1A 8Kx8 fully buffered, S-100, uses 2102 type RAMS. PCBD ..... $24.95, $168 Kit

QMB-12 MOTHER BOARD, 13 slot, terminated, S-100 board only ..... $34.95 $89.95 Kit

CPU-1 8080A Processor board S-100 with 8 level vector interrupt PCBD .. $25.95 $89.95 Kit

RTC-1 Realtime clock board. Two independent interrupts. Software programmable. PCBD ..... $25.95, $60.95 Kit

EPM-1 1702A 4K EPROM card PCBD ..... $25.95 $49.95 with parts less EPROMS

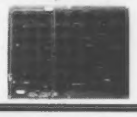
EPM-2 2708/2716 16K/32K EPROM card PCBD ..... $24.95 $49.95 with parts less EPROMS

QMB-9 MOTHER BOARD. Short Version of QMB-12. 9 Slots PCBD ..... $30.95 $67.95 Kit

MEM-2 16Kx8 Fully Buffered 2114 Board PCBD ..... $25.95, $269.95 Kit

T.V. TYPEWRITER

• Stand alone TVT • 32 char/line, 16 lines, modifications for 64 char/line included • Parallel ASCII (TTL) input • Video output • 1K on board memory • Output for computer controlled curser • Auto scroll • Non-destructive curser • Curser inputs: up, down, left, right, home, EOL, EOS • Scroll up, down • Requires +5 volts at 1.5 amps, and -12 volts at 30 mA • All 7400, TTL chips • Char. gen. 2513 • Upper case only • Board only $39.00 Part No. 106, with parts $145.00 Part No. 106A

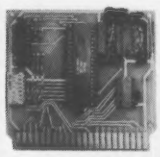


TAPE ✲ INTERFACE

• Play and record Kansas City Standard tapes • Converts a low cost tape recorder to a digital recorder • Works up to 1200 baud • Digital in and out are TTL-serial • Output of board connects to mic. in of recorder • Earphone of recorder connects to input on board • No coils • Requires +5 volts, low power drain • Board only $7.60 Part No. 111, with parts $27.50 Part No. 111A

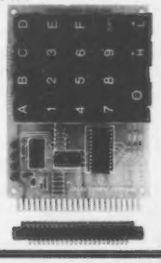
UART & BAUD RATE GENERATOR✲

• Converts serial to parallel and parallel to serial • Low cost on board baud rate generator • Baud rates: 110, 150, 300, 600, 1200, and 2400 • Low power drain +5 volts and -12 volts required • TTL compatible • All characters contain a start bit, 5 to 8 data bits, 1 or 2 stop bits, and either odd or even parity. • All connections go to a 44 pin gold plated edge connector • Board only $12.00 Part No. 101, with parts $35.00 Part No. 101A, 44 pin edge connector $4.00 Part No. 44P



HEX ENCODED KEYBOARD E.S.

This HEX keyboard has 19 keys, 16 encoded with 3 user definable. The encoded TTL outputs, 8-4-2-1 and STROBE are debounced and available in true and complement form. Four onboard LEDs indicate the HEX code generated for each key depression. The board requires a single +5 volt supply. Board only $15.00 Part No. HEX-3, with parts $49.95 Part No. HEX-3A. 44 pin edge connector $4.00 Part No. 44P.



DC POWER SUPPLY✲

• Board supplies a regulated +5 volts at 3 amps., +12, -12, and -5 volts at 1 amp. • Power required is 8 volts AC at 3 amps., and 24 volts AC C.T. at 1.5 amps. • Board only $12.50 Part No. 6085, with parts excluding transformers $42.50 Part No. 6085A

To Order: Mention part number, description, and price. In USA, shipping paid for orders accompanied by check, money order, or Master Charge, BankAmericard, or VISA number, expiration date and signature. Shipping charges added to C.O.D. orders. California residents add 6.5% for tax. Outside USA add 10% for air mail postage and handling, no C.O.D.'s. Checks and money orders must be payable in US dollars. Parts kits include sockets for all ICs, components, and circuit board. Documentation is included with all products. Prices are in US dollars. No open accounts. To eliminate tariff in Canada boxes are marked "Computer Parts." Dealer inquiries invited. 24 Hour Order Line: (408) 226-4064

✲ Circuits designed by John Bell

For free catalog including parts lists and schematics, send a self-addressed stamped envelope.

ELECTRONIC SYSTEMS Dept. X, P. O. Box 21638, San Jose, CA USA 95151

CIRCLE 149 ON READER SERVICE CARD

NAD — Name and Address Record Selection System

Eric Van Horn

NAD is a general purpose mailing list system from Structured Systems Group, 5208 Claremont Avenue, Oakland, California. It consists of four separate and distinct programs, NADENTRY, NADXTRAK, NADPRINT, and NADLABEL. The sorting package, QSORT, is available separately (or you can use whatever sort package you might already have). NAD Requires a CP/M based system, CBASIC and a minimum of 48K of memory. CBASIC is also available from Structured Systems.

NADENTRY handles all the routine file maintenance chores and allows the user to add, change, delete, examine or save records. The record format gives ample room for most general purpose use, providing spaces for name, 2 address lines, city, a two character state code, zip code (with an option for international postal codes), phone numbers and a reference line. The reference line is for whatever you want and can be set for anywhere from 0 to 127 characters long. We are using the reference line to set up codes for types of advertisers, businesses, etc. This greatly enhances the number of sorting options available, as well as cutting down on the total number of separate files which must be maintained.

Records can also be set up to be fixed or variable length. The actual record length remains the same, but you can take space from one field to make another field longer. (A field is one line, so the name line is one field, address line 1 is another field, etc.) This is particularly useful when you have a long name, like "The Tchaikovsky School for Subtle and Soothing Symphonies," but only a short address like "P.O. Box 37." NAD will automatically take the unused space in the address lines and put it in the name field.

One other feature I found particularly interesting is what Structured Systems calls name flipping. Mailing list systems have traditionally included various awkward ways of sorting names by alphabetical order. (One package I saw made you enter the name twice, once with the last name first for sorting purposes, and once in normal order for printing. Ugh!) With name flipping, the name is typed in last name first with an asterisk between the last and first names. This takes care of the sorting problem. But, whenever you do a print, using either the NADPRINT or NADLABEL programs, the asterisk is deleted, the first and last names are flipped and printed in standard first name first order. This is by far the least cumbersome method I have seen.

NAD does not provide any extensive editing features other than hitting the escape key to back up to a previous line, so you are essentially limited to whatever cursor control and editing features other than hitting the escape key to back up to a previous line, so you are essentially limited to whatever cursor control and editing features your terminal has. File maintenance (updates, etc.) has the same editing limitations, with changing, deleting and examining records done by specifying the record number.

NADXTRAK will create subsets of a master file by selecting the records that are specified. It also serves to reclaim lost disk space lost during the deletion of records. NADPRINT and NADLABEL provide hardcopy lists and/or labels and provide the same record selection features as NADXTRAK.

So, how good is it? NAD provides almost all the file manipulation capabilities that are desirable in a mailing list package. But, it is not easy to learn if you are not familiar with computers. I have a prejudice toward software which is not totally easy to use. For example, having a menu which says:

1. File Maintenance
2. Print Labels
3. Print Lists
4. Extract Files

Enter Option?

would be a simple but valuable addition and from a programming standpoint is not hard to do. As it stands, each time you want to perform a different function or change over to another mailing list, you have to exit from the current program, type "CRUN (Program Name)," and start all over again. (Unfortunately, the NAD programs come as intermediate files and you can not make such changes yourself.) This is not the way I like software to be written.

Another distracting feature is that all file maintenance, changes, deletions, etc., is done by specifying the record number of the name and address to be changed. So if you want to change the reference line for "George Gershwin" and you do not know the record number, you must exit from NADENTRY, run NADPRINT (using record selection and selecting the name field and "George Gershwin"), get the record number and rerun NADENTRY to make the proper changes. You could probably get around this by keeping a current hard-copy list of the sorted file, but when you change the file daily as we do this simply is not feasible.

There are no bugs of which I know — and we have used NAD extensively — but two problems caused us a great deal of time and consternation. Although NADENTRY checks for correct record length, it apparently recognizes a line feed as a single character. However, when the record is written to the disk a full line of spaces is written. This will crash the system the next time you go to read that record. It took us a long and frustrating afternoon with the CP/M text editor to rearrange and correct a file with this problem.

The other problem we have had concerns the use of the Escape key. As I mentioned, the Escape key is normally used to go back to a previous line in an individual record in order to make changes. However, it must be hit at the beginning of the line or NADENTRY reads it as just another character. In most cases this would mean nothing more than a funny "" on your printout, except that several times when we tried to read a file containing out of place Escape characters, the Escape was executed as a command and returned the systems to DOS. That gave us another opportunity to exercise the CP/M editor.

I realize these may seem like picky points. Certainly if I had the hardware on which to run it, I would strongly consider using NAD. Whether NAD is right for you depends on what hardware and software you already have and who is going to use it. Keep in mind you will need a 48K system, CP/M, CBASIC and a sort program to fully utilize it. And having taught NAD to some non "computer people" (you know, the old-fashioned kind with arms and legs and such), I cannot say it is very easy to learn. On the other hand, I have seen some fancy, interactive mailing list programs without nearly the same capabilities as NAD, and given a choice I would rather have one that does what I want it to do. □

Apple II is at The Computer Store

The Apple® II, today's most popular personal computer, is at The Computer Store. Along with the latest in Apple peripherals. Like the new Disk™ II floppy disk drive. Or, printer and communications interfaces. And, the latest in software including the new Apple/Dow Jones Stock Quote Reporter. The compact Apple II gives you 48K RAM memory with full color graphics and high resolution graphics. It's the most powerful computer in its price range.

At The Computer Store, we have more than ever before in microcomputers, memories, terminals and peripherals. All backed by a technical staff and a full service department. Stop in today, you'll find more than ever before at The Computer Store.

The Computer Store

820 Broadway, Santa Monica, California 90401 (213) 451-0713

The Original Name In Personal Computer Stores

***Store Hours:* Tues.-Fri., 10 am-8 pm, Saturday, 10 am-6 pm**

Located two blocks north of the Santa Monica Freeway at the Lincoln Blvd. exit.

Phone and mail orders invited. BankAmericard/Visa and Master Charge accepted.

CIRCLE 132 ON READER SERVICE CARD

ELF II by Netronics

Write and run programs–the very first night–even if you've never used a computer before!

You're up and running with video graphics for just $99.95 — then use low cost add-ons to create your own personal system that rivals home computers sold for 5-times ELF II's low price!

Featuring **RCA** 1802 COSMAC

Own a powerful home computer system, starting for just $99.95–a price that gets you up and running the very first night with your TV set for video display. $99.95 ELF II includes RCA 1802 8 bit microprocessor addressable to 64K bytes with DMA, interrupt, 16 registers; ALU; 256 byte RAM, full hex keyboard, two digit hex output display, stable crystal clock for timing purposes. RCA 1861 video IC to display your programs on any video monitor or TV screen *and 5 slot plug in expansion bus (less connectors) to expand ELF II into a giant!*

ELF II Explodes Into A Giant!

Master ELF II's$99.95 capabilities, then expand with GIANT BOARD to record and play back programs, edit and debug programs, communicate with remote devices and make things happen in the outside world. KLUGE BOARD to use ELF II as a controller. 4K RAM BOARDS. TINY BASIC. ASCII KEYBOARD. LIGHT PEN. ELF BUG. MONITOR. COLOR GRAPHICS & MUSIC SYSTEM. TEXT EDITOR. ASSEMBLER. DISASSEMBLER. VIDEO DISPLAY BOARD *and more!*

More Breakthroughs Coming Soon!

Soon to be introduced: ELF II special application kits: PROM Programmer. A/D, D/A Converter. Controller Board *and more!*

So don't be trapped into buying a dinosaur that's already obsolete. An ongoing commitment to develop the RCA 1802 for home computer use by Netronics keeps you right on the outer fringe of today's home computer technology.

Order your ELF II, direct from the factory, with the coupon below! Netronics guarantees your success!

Netronics R&D Ltd., Dept. CC6
333 Litchfield Road, New Milford, CT 06776

PHONE ORDERS ACCEPTED! Call (203) 354-9375

Yes! I want my own computer! Please rush me—

☐ RCA COSMAC ELF II kit at $99.95 plus $3 postage and handling (requires 6.3 to 8 volt AC power supply).

☐ Power Supply (required). $4.95 postpaid.

☐ RCA 1802 User's Manual. $5 postpaid.

☐ Tom Pittman's **Short Course On Microprocessor & Computer Programming** teaches you just about everything there is to know about ELF II or any RCA 1802 computer. Written in non-technical language it's a learning breakthrough for engineers and laymen alike. $5 postpaid.

☐ Deluxe Metal Cabinet with plexiglas dust cover for ELF II. $29.95 plus $2.50 p&h.

☐ I am also enclosing payment (including postage & handling) for the items checked below.

☐ **I want my ELF II wired and tested with power supply, RCA 1802 User's Manual and Short Course—all for just $149.95 plus $3 p&h.**

Total Enclosed: $ _____ (Conn. res. add tax)

CHARGE IT! Exp. Date _____
☐ Visa ☐ Master Charge
(Bank # _____)
Account # _____

ALSO AVAILABLE FOR ELF II

☐ **GIANT BOARD™** kit with cassette I/O, RS-232 C/TTY I/O, 8 bit P I/O decoders for 14 separate I/O instructions and a system monitor/editor. **$39.95** plus $2 p&h.

☐ **Kluge** (Prototype) **Board** accepts up to 36 IC's. **$17.00** plus $1 p&h.

☐ **4k Static RAM kit**. Addressable to any 4k page to 64k. **$89.95** plus $3 p&h.

☐ Gold plated **86-pin connectors** (one required for each plug in board). **$5.70** ea., postpaid.

☐ **Expansion Power Supply** (required when adding 4k RAM). **$34.95** plus $2 p&h.

☐ **Professional ASCII Keyboard** kit with 128 ASCII upper/lower case set, 96 printable characters, onboard regulator, parity logic selection and choice of 4 handshaking signals to mate with almost any computer. **$64.95** plus $2 p&h.

☐ **Deluxe metal cabinet for ASCII Keyboard. $19.95** plus $2.50 p&h.

☐ **Video Display Board** kit lets you generate a sharp, professional 32 or 64 character by 16 line upper and lower case display on your tv screen or video monitor—dramatically improving your unexpanded $99.95 ELF II. (Fits inside ASCII Keyboard cabinet.) **$89.95** plus $2 p&h.

☐ **ELF II Tiny BASIC** on cassette tape. Commands include SAVE, LOAD, ±, ×, ÷, (), 26 variables A-Z, LET, IF/THEN, INPUT, PRINT, GOTO, GO SUB, RETURN, END, REM, CLEAR, LIST, RUN, PLOT, PEEK, POKE. Comes fully documented and includes alphanumeric generator required to display alphanumeric characters directly on your tv screen without additional hardware. Also plays tick-tack-toe plus a drawing game that uses ELF II's hex keyboard as a joystick. 4k memory required. **$14.95** postpaid.

☐ Tom Pittman's **Short Course on Tiny Basic** for ELF II. **$5** postpaid.

☐ **ELF-BUG™ Deluxe System Monitor** on cassette tape. Allows displaying the contents of all registers on your tv at any point in your program. Also displays 24 bytes of memory with full addresses, blinking cursor and auto scrolling. A must for the serious programmer! **$14.95** postpaid.

☐ **Text Editor** on cassette tape gives you the ability to insert, delete or edit lines and words from your programs while they are displayed on your video monitor. (Add printer and you can use ELF II to type error free letters, plus insert names and addresses from your mailing list.) **$19.95** postpaid.

☐ **Assembler** on cassette tape translates assembly language programs into hexidecimal machine code for ELF II use. Mnemonic abbreviations for instructions (rather than numerics) make programs easier to read and help prevent errors. **$19.95** postpaid.

☐ **Disassembler** on cassette tape takes machine code programs and produces assembly language source listings to help you understand and improve your programs. **$19.95** on cassette tape.

SAVE $9.90—Text Editor, Assembler & Disassembler purchased together, only **$49.95!** (Require Video Display Board plus 4k memory.)

☐ **ELF II Light Pen**, assembled & tested. **$7.95** plus $1 p&h.

☐ **ELF II Color Graphics & Music System Board** kit **$49.95** plus $2 p&h.

☐ ELF II connects directly to the video input of your tv set without additional hardware. To connect ELF II to your antenna terminals instead, order **RF Modulator, $8.95** postpaid.

Coming Soon: A/D, D/A Converter, Controller Board, and more!

Print
Name _____

Address _____

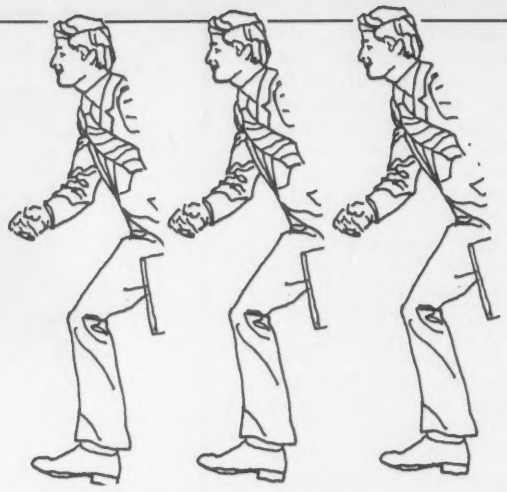
City _____

State _____ Zip _____

DEALER INQUIRIES INVITED

CIRCLE 199 ON READER SERVICE CARD

Halve Your Job



**A view of the future.
Less work, more knowledge,
and more computers.**

Andrew Curtin Page

In those professions in which there is acute competition for employment, a possibility which I shall attempt to describe as not altogether outrageous comes to mind. Instead of rumblings about a four day work week, why not a two and a half-day schedule with then the hiring of twice as many people? And half the pay. In what follows, I shall investigate how to fill the pay packet back up again, which leads me to a discussion of computers.

In 1833, Charles Babbage, technological genius of Totnes, conceived the idea for an 'Analytical Engine' which was the prototype of the modern computer. With the recent introduction of micro-computer systems, Babbage's invention now heralds a new and qualitative change in the use of computers. Until now, computers have been reserved for a select few, and their manipulative effect in the programming of many aspects of our lives has led many people justifiably to regard computers and high technology generally as a mixed blessing, to say the least.

Perhaps its worth some time for us contemporary Totnesians interested in the characteristics of the post-industrial age to reflect upon what sorts of things computers should do in order to enhance the quality of every day life.

The first and most essential phase in this prescriptive process has been technologically accomplished. The price of a computer is now coming within the range of the public at large. We can expect to be able to buy a computer for around the same cost as a television set. Unlike a television, however, the computer is not a passive instrument.

Andrew Curtin Page, 1 Vineyard, Dartington, Totnes, Devon TQ9 6HW, England.

An area of potential for the computer could be as a means of helping us to establish a more satisfactory employment and occupations system. The general rule today is: one person, one job. But perhaps with the help of the computer, operated at one's home or community center console, we might be able to progress towards the situation of: one person, many jobs - part time and in short shifts - providing wider life experience, more social contacts, less boredom and stagnation, and help in getting us beyond relating to each other according to our occupations.

This concept might initially take the form of our holding predominant rather than exclusive occupations. For two or three days per week I work as an accountant, for example; for the remaining days in the week I select short-shift jobs in any one or more of a variety of occupations. The home computer console plugged into community employment bureau files provides me with my own employment agency.

In this usage of the computer, what we have, in fact, is simply an electronic rather than paper filing system with the advantage of instantaneous, easy, and multiple access to all information.

The system of halving the work week would double the employment opportunities. Current job holders could figure out how their work would be divided and shared with another person - each then to work roughly a twenty-hour week. Many jobs are already organized on a shift basis. Maintain one desk, hire two people, or three, and keep the office or plant open longer (so that new offices and expansion of premises would be less required).

Secure in our predominant half-time jobs, we could then turn to self-employment occupations, e.g., small-holding farming, crafts enterprises, or who-knows-what if the incentive were given, seed capital available, planning regulations relaxed, dole money converted to self-employment and cooperative subsidies.

And/or, to fill immediately the half-empty pay-packet, one could switch on the home computer, tune in on the community immediate vacancies employment files, and select a short shift in any of the jobs which are currently filled not because they are not particularly well paid, nor interesting, nor full-time, and also because few people want to be stuck permanently in such a role, e.g., farm labourer, hotel and catering staff, janitorial work, hospital aid or orderly, old people's home or mental hospital attendant, shop clerk, domestic services, cleaning-person, gardener, etc.

The point is, taking a short shift job in such work I would not be typecast, I still have my half-time predominant occupation. And while streetsweeping forty hours per week is sheer drudgery, for a few hours every fortnight or so it might even be experienced as a form of leisure (with pay).

With a system such as Halve-Your-Job, more people would have the opportunity to work in a preferred occupation; unpopular jobs could be more equitably shared. And with the chance to work half-time in a preferred occupation, even more vacancies in currently unpopular jobs would occur.

The computer program of Dial-a-Job would enable us to earn the required extra money by means of selecting short shifts in diverse jobs according to our own schedule with

no loss of respect, no fear of long-term commitment.

Employers would also benefit; the computer would immediately post a vacancy dialed in from the boss's desk. Employers might offer more jobs to fit their fluctuating needs, so long as it was understood as only a short-shift obligation and easy to arrange. Everyone would benefit in so far as this program leads to the creation of a mobile labor force.

It would seem essential for such a system to be organized and controlled on a community basis. Besides the value of multiple and diversified occupations and sharing unpopular work, several other prescriptive assumptions underlie this envisaged use of the computer: individuals would have the opportunity for greater choice and job satisfaction. People would be brought into closer and more necessary contact with their fellow community residents. The community as a whole rather than one's job would become the referent in our lives. At least some work should be available to every resident. The entire employment system would become a more cooperative situation rather than the current all or nothing, competitive structure.

With multiple jobs there would be required extensive on-site training programs. Work would consist of practicing a predominant skill, teaching this work to others, then also learning, and talking on new jobs in short shifts. To some degree, work and education would be more harmoniously blended.

The home computer console as linked with the community coordinating center could not only provide information, but also be used to establish contact. Upon 'isolating' a short shift, part-time, job on one's home console, one could then dial for more specific information and use the computer to 'sign up' for a particular work shift. The payment for work done could also go through the community computer system as linked with one's bank.

An allied use of the computer could be as a means of dialing TV programs. At the community library, a collection of video tapes could be maintained. At home, the computer console would be linked to the television. From a telephone book-type catalogue and/or via the computer console, one could review which tapes are available, then dial for a particular taped program which would then be played at the library and by cable transmitted to one's home television set. Much of this technology has already been worked out, cf. Teletext and Viewdata in Britain.

I think it is fair to assume that, with 'Dial TV' rather than the current scheduled network system, we would watch less television. On switching on the TV, nothing would happen until the viewer dialed for the program of his or her choice. We would not feel that we might miss something, we might not so automatically fall into a daze before the box, for **we** would be selecting what we wanted to see in our own designated time. The community job-training video tapes and the Open University could be similarly coordinated, i.e., dialed for according to one's own schedule.

The home computer terminal could also enable us to conduct community, regional and even national government on a truly participatory basis. One could use the machine to vote on specific issues and, moreover, submit the propositions themselves for vote.

I hardly think Dial-a-job, Dial TV, and Participatory Democracy occured to Charles Babbage when he designed his Analytical Engine, but the age which he helped inaugurate now unquestionably calls for a thorough reappraisal and changes - from the grass roots up rather than from the technology down. □

Your TRS • 80 Apple II Micropolis Vector MZ
Exidy Sorcerer Cromemco CBasic-CP/M Microsoft **Computer**

WILL SAVE YOU THOUSANDS!

WITH OUR BUSINESS SOFTWARE *A FLEXIBLE STARTER SYSTEM*

EASY TO UNDER STAND & USE

GENERAL LEDGER • • ACCTS. RECEIVABLE
ACCTS. PAYABLE • INVENTORY • PAYROLL

Buy simple, effective programs designed specifically for your machine. Call us once for same week delivery on a product you can use the day you receive it, and two years from now when your company is twice as big. **And ask about MICROMAX** - our computer output videotape system.

TRS • 80: $100/each. CBASIC-CP/M: $200/each. Apple II, Micropolis, Vector, Exidy, Cromemco, and Microsoft: $140/each.

Order today by U.P.S. COD, or with Visa, Mastercharge, or your personal check—we'll pay postage and handling.

CompuMax Associates, Inc.

[415] 321-2881 505 Hamilton Ave. Palo Alto, CA 94301

CIRCLE 128 ON READER SERVICE CARD

"BIG-EDIT" FOR BIG APPLE II PROGRAMMERS

- Convert your INTEGER or APPLESOFT BASIC programs to "text" files on disk for easy editing and subroutine library development!
- Quickly change lines in "text" programs; search and replace occurrences of strings; merge lines from other program files; restructure programs!
- Renumber your programs — you specify the starting number and increment!
- Strip REM's from "execution" versions of your programs (improves speed and frees up memory)!
- Create and edit non-program text files (letters, announcements . . .)!
- Prints upper and lower case on line printer, inverse video on screen!
- Comes complete with System Disk, User's Manual and handy Reference Card!

REQUIRED: APPLE II with Floppy-Disk drive, APPLESOFT BASIC in ROM, and 32K minimum RAM (48K is recommended). "BIG-EDIT" supports optional printer.

CIRCLE 202 ON READER SERVICE CARD

GARVEY, MARTIN & SAMPSON, INC.
210 Bavarian Drive
Middletown, Ohio 45042
Phone: (513) 423-6608

Enclosed is $39.95. Send me "BIG-EDIT" (ASAP!).

Name _____
Address _____
City/State/Zip _____

TBS OFFERS SYSTEMS

The creators of the LIBRARY 100 continue to provide you with items necessary to turn your computer into a full fledged system.

TBS was founded to assure the TRS-80 owner that software would be available for his needs; however the "firmware" needs of computer owners are just as great. The fanciest check writing Payroll Program is not usuable if the checks are not available. TBS carries personalized checks in small quantities on computer rolls and fanfold.

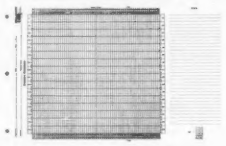
While continuing to build programs to fulfill the needs of Radio Shack TRS-80 computer owners, TBS, and its dealers, now carry full lines of computer work stations, printer forms, blank paper, power isolation cords, magnetic recording media, and over 200 other items. A full list of items is available in SYSTEMS EXTENSIONS, and color pictures will be available at participating TBS dealers.

TBS Work Stations

At last, a proper work station for your computer is available! Designed for computers from the ground up, complete with hidden trays and cable runs for those unsightly cables. TBS work stations are completely modular, and may be designed by you for any number of operators, printers, file storage space, and other items necessary to give you a first class computer work station. Your choice of colors is available.

See your local TBS dealer for a full catalog, or the summary available in Systems Extensions.

TBS Pad System — $19.95 set of five



Programmers pads, 11½" x 17". Punch for insertion and storage in a standard three ring notebook binder. All necessary indexes and numbers for your programming convenience on a TRS-80 or other 16 x 64 CRT.

Your dealer has a sample! Set of five different fifty page pads.

Computer Paper

All standard papers, fanfold or rolls 8½" to 14" in quantities as low as one box.

Available from stock! See your Dealer or SYSTEMS EXTENSIONS for prices.

Systems Extensions — $3.00

Systems Extensions is published and marketed by TBS, creators of the LIBRARY 100. The articles published in Systems Extensions were written by our staff of TOP QUALITY PROGRAMMERS at TBS, to aid you with your computer. Also incorporated in this publication is a group of over 300 items designed to support your computer system.

Partial Table Of Contents

1. Computers of the Past
2. Computers the Present and Next Two Years
3. Computers the Future and Next Ten Years
4. TRS-80 and the Business System Community
5. Standards for Professional Programming
6. Preparing for Programming
   A Business and Professional Application
7. Methods to Program Your System
8. Review of the Electric Pencil
9. Random Ramblings
10. Computer Aided Instruction
11. The Diskette Revolution
12. Level II Index
13. The Purchase, Care and Maintenance of A Business Computer
14. Your Computer and the Wall Socket

Diskettes — Box of 10, $38.00

New from TBS and Wabash Tape Corp. TBS, the leading name in TRS-80 software, and Wabash, the leading name in computer magnetic recording materials, presents, for your microcomputer disk system 5¼" mini diskettes.

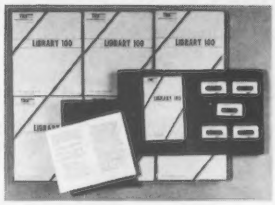
Only TBS and Wabash can assure you that each diskette has been individually certified, and certified to 3200 BPI! Further, EACH one is guaranteed for one year after purchase.

Cassettes — $1.90 3 for $5.40

Our cassettes are designed specially for use in RADIO SHACKS'S TRS-80 and other audio based computers. TBS backs its cassettes with a 90 day warranty against parts and material defects. TBS has equipped its cassettes with special features for you: sliding write protect tabs, extra large pressure pad and a 5 screw assembly. These cassettes are of TBS quality, built for your convenience in your TRS-80 or other audio based computers.

S COMPLETE
S BACKUP.

Library 100—$49.50



The Library 100 was designed to fulfill your general TRS-80 Level II programming needs. Using advanced Level II techniques and rigid quality control, The Bottom Shelf has been able to make available 100 programs on five guaranteed-to-load cassettes, which load over a wide range due to advanced recording techniques and methods designed by engineers for The Bottom Shelf. The programs include applications in five areas: Business and Finance, Education, Graphics, Home and Games.

As an added bonus, you get Tiny PILOT, the first new high-level language for the TRS-80. It's perfect for teachers, parents, students and sales trainees.

Mail List—$125.00

For your 32K, two disk drive and printer TRS-80, an endless mailing list!

MAIL LIST keeps 500 names and addresses per disk, together with three numeric codes and one alphabetic code for each name. 500 records per disk, and any number of disks that you wish. MAIL LIST keeps all entries in zip code and then last name order, and keeps track of which disk is holding which items. Automatic prompts instruct the operator as to which disk should be inserted. Selectable printouts for labels or other lists for hard copy storage. Full EDIT, DELETE, and other commands for your operators convenience. See SYSTEMS EXTENSIONS or your dealer for full details. **The first TRS-80 batch-processing program.**

System Doctor—$28.50

Now you can check your TRS-80 Level II computer and all it's peripherals with this program. SYSTEM DOCTOR allows you to selectively test any function or peripheral or continuously test your system. Run this program once a week or when trouble occurs. Be your own computer diagnostician.

Checkbook II—$18.50

By Alan Meyers

The technical expertise of TBS has been synthisized into a program that upgrades checkbook analysis to an interesting, informative and fun portion of your regimen. This program outshines the other programs of its type to such a degree that it is a new category of checkbook analysis for the consumer.

Featuring:

- Five column keyboard input handling amounts up to $100,000.
- Complete editing mode allowing changes in any or all columns plus a deletion module.
- Checkbook balancing with balance brought forward always in memory and recorded on tape.
- Bank reconcile with listing of all outstanding checks. Automatically deletes all cleared checks upon completion.
- Search and Total from all checks in memory or an entire month by all fields but amount.
- 16K version holds 75 transactions while the 32K holds 400!

The Basic Toolkit—$19.80

By F. Barry Mulligan

A Programmer's Solution. The Basic Toolkit is a dream come true! This machine language program will do the following:

- Search a basic program, and print out to screen or printer, an alphabetized listing of the variables used in the program and the line numbers in which they are found.
- Search and print to screen or printer, a listing of all GOTO's and GOSUB's and the line numbers in which they appear.
- Restore basic programs that have been accidentally lost (after typing NEW or WHEN YOU GO TO DOS).
- Will check for bad memory in 15 seconds.
- WILL MERGE PROGRAMS ON A CASSETTE BASED SYSTEM!
- Will search memory for all occurences of a specific byte and list the locations where it appeared.

See your local TBS dealer, over 100 nationwide. Master Charge or Visa accepted. All orders plus $2.00 P & H. Add 4% tax, if Georgia. Above software for TRS-80 16K L II.

TBS INC.

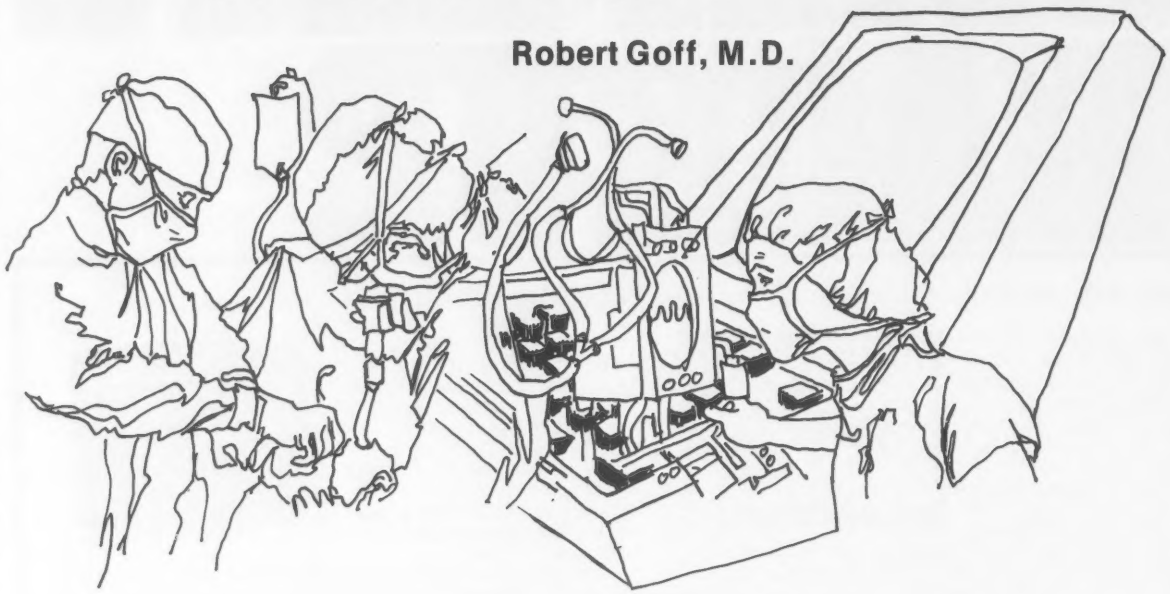
The Bottom Shelf, Inc.
P.O. Box 49104
Atlanta, Georgia 30359
Phone: 404-939-6031

CIRCLE 101 ON READER SERVICE CARD

Microcomputer Feasibility In The Hospital Setting

With the cost-effectiveness of today's microcomputer systems it's beginning to look like a good case can be made for several dedicated systems...rather than one, trying to do it all.

Robert Goff, M.D.



Introduction

Microcomputer systems are now capable of managing many of the computer applications within a hospital. Such implementations, however, are not very much in evidence. This is not for lack of appropriate hardware, nor because of the shortage of suitable software (though the software is hard to find), but rather a result of the reticence of hospital administrations to seriously consider microcomputers as a realistic alternative to the larger mainframes. This is understandable in light of the scarcity of examples of successful microcomputer applications in hospitals. It is also understandable when one considers that at most hospitals the computer consultant (if one exists in the institution) has a full grasp of the capabilities, shortcomings, and costs of larger computers, but little, if any knowledge of microcomputers. This is augmented by the contrast between vendors of large computers and vendors of microcomputers. The former utilize impressive advertising investments to acquaint hospital administrators with their wares. The latter, of course, make almost no attempt to do so. This discussion focuses on the issues of the desirability of microcomputers in hospitals, and an approach to demonstrating their feasibility.

Robert Goff, M.D., Berkeley Medical Data Associates, Inc., P.O. Box 5279, Berkeley, CA 94705.

The Hospital Computer Environment

What tasks are currently performed by computer within the hospital setting? Accounting, billing, payroll, inventory, and census come quickly to mind. Many central laboratories have computerized their data. Pharmacies have automated their in-house dispensing of medications and check for potential drug interactions by computer. The list of applications is really quite long. Can a microcomputer handle these diverse tasks? Of course not. Not single handedly. But herein lies the strength of the microcomputer. Because a microcomputer system can be cost effective when applied to only one or a small number of simultaneous tasks, it provides immense advantages in terms of flexibility and implementation time.

Consider the large mainframe installation. Its cost requires that it be shared among a sizeable number of simultaneous tasks, perhaps even timeshared outside the hospital. As a result, its operating system must be capable of handling all of these tasks. Its applications programs must all be implemented before the installation will become cost effective. Two years is a reasonable estimate of the time required from planning to completion. The hospital must be prepared to commit an impressive amount of the institution's financial resources to computer purchase contracts which, more often than not, do not guarantee that the final installation (two years later) will meet their needs or, for that matter, be functioning reliably (1). The installation will require a substantial continuing cost for hardware maintenance as well as software updating and modification. The total dollar commitment is so large that changing systems, if the first is found to be unsatisfactory, is almost impossible.

A microcomputer, on the other hand, may be cost effective even if dedicated to a single task. Its total cost, in any particular application, is comparable to the annual salary of the lowest paid employee. In several applications I've developed, it may easily pay for itself within a few

months. The continuing maintenance costs are minimal and software updating may be successfully undertaken by an individual with a knowledge of the rudiments of computer processing. If, after a year or so, it is found to be unsatisfactory, its abandonment is not hampered by the need to restructure the data processing needs of the entire hospital. Development time for any particular microcomputer application ranges from one to six months, in most cases, and allows the finally developed implementation to approximate more closely the projected needs. It bypasses the nearly impossible chore of projecting the needs of the whole institution two or more years into the future.

Feasibility Demonstrations

After an institution has made the decision to install a large mainframe computer, the administration must set about the task of determining the feasibility of various hardware and software configurations for each of the projected applications. In some instances, similar applications at other institutions may be inspected to determine the strengths and weaknesses of their specific configurations, though such information is sometimes shrouded by the pride and embarrassment of administrators who have committed their hospitals to costly contract errors. More often, however, feasibility must be demonstrated "on paper" by attempting to simulate the final installation by outcome analysis techniques. While these estimates may be reasonably accurate for any particular application, their inherent error is cumulative for the system as a whole, and may, therefore, fail to predict fatal shortcomings of the contracted hardware and software.

The situation is much simpler for microcomputers. Since the needed feasibility study encompasses only one application, the likelihood of a valid conclusion is greater. An added benefit is that if the system ultimately purchased fails to meet the demands placed upon it in its intended application, then it is a relatively easy adjustment to assign it to a different task.

The Feasibility Computer

At Children's Hospital in Oakland, California, the problem of demonstrating the feasibility of various microcomputer applications was solved by purchasing a complete microcomputer system. This system took on, as its sole application, the job of demonstrating the feasibility of microcomputer implementations in several areas of the hospital. Its purchase was initially justified by demonstrating "on paper" that it was capable of performing a single cost effective task — that of monitoring the chargeable items used within the Intensive Care Nursery. If it could not be shown to be feasible in any other application, then it would be assigned to that dedicated task, and pay for itself in about three to four months.

The hardware and software were selected to be most compatible with the array of possible applications which it would test. Since one particular application required a triple floppy disk drive, three North Star Microdisk Drives were selected. The

computer is a SOL-20 with 48K bytes of RAM. A Diablo 1610 receive-only graphics printer was chosen to enable the development of graphics output in certain of the applications. The software included the North Star DOS and North Star extended disk BASIC, Michael Shrayer's Electric Pencil II text processor, CP/M on North Star from LifeBoat Associates, and Microsoft FORTRAN 80. It was felt that this broad selection of software would enable the system to find maximal use.

A custom desk was constructed by a local cabinet shop, at a cost of about $260. The desk was designed with four heavy duty casters, and holds all of the hardware, a complete box of full width tractor feed paper, and has several compartments for easy access to manuals and a supply of floppy disks. Its height is that of a typing desk, and underneath is a hospital-grade electrical outlet strip so that the entire mobile unit may be plugged into a single outlet. Because of the easy mobility of the complete system, it may be wheeled to the site of any feasibility demonstration without the fear of transporting the numerous hardware components. In addition, the demonstration site does not need to be cleared of existing equipment to make room for the temporary computer. The mobile desk is considered a vital component in the use of the feasibility computer.

At the outset of this project, a list of possible feasibility demonstrations was drawn up by a small committee of administrators, physicians, and the chief biomedical electronics technician. The list was dictated by the specific current needs of the hospital, and included the following:

1. A monitor for the two Corning Blood Gas Analyzers.
2. A data base manager for the Neonatal Follow-up clinic.
3. Scheduling of the more than 120 nurses on the Intensive Care Nursery staff.
4. On-call scheduling for the Resident house staff.
5. A bedside data base retrieval system for the Intensive Care Nursery.
6. An inventory and billing system for the medical materials used within the Intensive Care Nursery.

The list was only a guideline and could be modified as needs changed; however, the priority item was the monitor for the blood gas analyzers. For this particular application, an additional I/O board was purchased with the provision that it would remain with the system eventually installed in the blood gas lab.

The obligation of the feasibility computer system is only to demonstrate that a particular application is feasible after which the responsibility falls upon the clinical area envolved to purchase a new microcomputer system to be dedicated to that application. The feasibility computer then moves on to other demonstration projects. Part of the process of demonstrating feasibility is the development of at least skeletal software to perform the task being tested, so the chore of applications software development is also born by the itinerant system prior to the actual feasibility demonstration.

The cost of the system was approximately $10,000 including the hardware, 100 floppy disks, all the system software, the desk, and a supply of expendables. Most of the finally implemented dedicated sys-

Feasibility, con't....

tems should cost about two to three thousand dollars less, since most do not need a printer of the Daisy-wheel variety and will need only one set of system software. The special interfacing required for some of the applications is only about $300.

The hardware and software were purchased together from a local retail computer store which was selected for its reputation of excellent hardware support and willingness to provide assistance in the planning of unusual applications. In lieu of a maintenance contract, buying from a responsible retail dealer within the vicinity of the hospital can be invaluable.

Results

This approach has not been applied for a long enough period to determine its general impact but it has resulted in considerably greater interest on the part of many hospital departments in the possibility of microcomputer applications. As more and more microprocessor-controlled biomedical devices are placed on the market the potential users of this equipment are looking more toward microcomputers for processing the data output.

So far the system has developed the following:

1. A fully implemented monitor for the Corning Blood Gas Analyzer (2).
2. A feasibility demonstration of a patient bedside data base retrieval system (still under development) for the Intensive Care Nursery (3).
3. A complete user's manual for the hardware and software of the feasibility microcomputer system itself to facilitate continued use of the system in the future.
4. An 8080 assembly language program for translating North Star BASIC to CBASIC (still under development).
5. A tabulation program for use in chart utilization review.

As further applications are completed, their outcome will be presented at this, and other forums. In June of 1979 a study of the real cost and results of this project will be concluded and the results published.

Acknowledgements

The author wishes to express his gratitude to Mr. Michael Lehey, Dr. Barry Phillips of Children's Hospital — Oakland, for their efforts to bring about this project, and to acknowledge the support of Children's Hospital Medical Center for providing the funds for the system discussed. To Mr. Loren Lewis, chief biomedical electronics technician at Children's Hospital must go credit for the design of the mobile computer desk and for his significant technical contribution to the continuation of this endeavor. The author must also commend Mr. Peter Hollenbeck and his staff at the Byte Shop of Berkeley for the high quality of their hardware support, and for their enthusiastic assistance.

Footnotes

1. Brandon DH, and Segelstein S: DATA PROCESSING CONTRACTS: Structure, Contents, and Negotiation. Van Nostrand Reinhold, New York, 1976. ($34.50)

2. Goff RCA: Microcomputer Applications For Biomedical Instrumentation: A Monitor for the Corning M-175 Blood Gas Analyzer. Proceedings of the Third West Coast Computer Faire. 11/78.

3. Goff RCA: The Bedside Microcomputer in the Intensive Care Nursery. Proceedings of the Second West Coast Computer Faire. 3/78. □

Creativity is not *what* is done but *how* one does it.—Barry Stevens

FOR PET, TRS 80, COMPUCOLOR.

SOUNDWARE adds music and sound effects to your computer. Includes DEMO PROGRAM, SOUND COMPOSER (to create your own BASIC sound subroutines) and instructions. Unit has volume control, earphone jack, connectors. 1 year warranty. $29.95 for PET & TRS-80. $39.95 for Compucolor (includes diskette).

SOUNDWARE SOFTWARE FOR 8K PET!

Compatible with all CB-2 sound devices. Features sound, super graphics, instruction booklet. 90 day warranty.

1. ACTION PACK—Breakthru (8 versions) / Target / Caterpillar
2. THE CLASSICS—Checkers (8 versions) / Backgammon / Piano Player
3. WORD FUN—Speller (4 versions) / Scramble / Flashcard

$9.95 per pack or 3 packs plus bonus program for $29.00. More sound programs coming: TRS-80 and Compucolor, too!

To Order: Send to CAP Electronics, Dept. CR4, 1884 Shulman Ave., San Jose, CA 95124, or call (408) 371-4120. VISA / Master Charge accepted. No charge for shipping when payment is included. Please add 15% for C.O.D. Calif. residents add 6% tax.

Prices subject to change without notice.

DEALER & DISTRIBUTOR INQUIRIES WELCOME

CIRCLE 125 ON READER SERVICE CARD

Mike's

YOUR

NORTH STAR ★ COMPUTERS

PROGRAMMING SPECIALISTS!

You can look to us for innovative and imaginative programs

** Intertec Intertubes now available **

Thinker Toys 8" Disk Drives for North Star Computers $995.00
Additional Drives $795.00

Many different and diversified computers systems available. All include full access to Program Library. Systems start at $4,995.00

DOSCHG

Patches to connect Thinker Toys 8" Disk Drives to North Star DOS & Basic. Fully supports all North Star Functions on 8" disk.

$49.95

CSUB

A set of Functions defined in North Star Basic that handle all disc accessing (Sequential, Random, & Keyed Access) and all CRT display, formatting & Input. A SUPERB APPLICATION PROGRAM DEVELOPMENT PACKAGE.

$49.95

TIMESHARE

Patches to North Star DOS & BASIC that take advantage of the versatility of the Horizon computer to implement an interrupt driven bank-switching time sharing system. Requires additional memory & terminals.

$49.95

Micro Mike's

905 Buchanan, Amarillo, Texas 79101

806-372-3633

CIRCLE 168 ON READER SERVICE CARD

SELECTRA-PRINT
Mr Comp Uter
01010 Computer Lane
Tommorrow, U.S.A
Dear Mr Uter
No need to settle for second best any longer. Now you can produce "hard-copy" print-outs on a Selectric II, and do it
Mr. Comp Uter
01010 Computer Lane
Tommorrow, U.S.A.
Dear Mr. Uter:
No need to settle for second best any longer. Now you can produce "hard-copy" print-outs on a Selectric II, and do it at a low cost!
You really should get more information on SELECTRA.

IF YOU OWN A TRS 80*.....

TRS-80 is a product of Radio Shack, A Tandy Corporation

SELECTRA-PRINT PUTS YOU JUST A CABLE LENGTH AWAY FROM A "HARD—COPY" (Typewriter Quality: clean, clear, high-fidelity) Word Processing System!

. . .just a simple hook-up with the supplied cables and your *SELECTRA-PRINT* is ready to run.

For Word Processing on a TRS-80, for example, just command "LPRINT" and *SELECTRA-PRINT* automatically outputs clear, clean, high-fidelity, hard copy. . . . and of course you can use it to print-out any other information you might need.

SPECIAL NOTE:
SELECTRA-PRINT is a Selectric II typewriter and although it has been modified for computer print-out, it may still be used as a standard office typewriter.

PRICE: $1,850.00* *TRS-80 Version $1925.00

OPTIONS:

Dual Pitch	$125.00
Correction Feature	$125.00
Noise Reduction Feature	$50.00
RS-232 Interface	$195.00

* *SELECTRA-PRINT is VERSATILE!*
SELECTRA-PRINT is compatible with most micro- and mini-computers including *PET ● Apple ● Heath H8 ● IMSAI ● Cromemco ● Alpha Microsystems ● Space Byte ● North Star Horizon ● SWTP ● Vector Graphic ● Sol ● Polymorphic ● Digital Group ● Ohio Scientific ● Altair ● Sorcerer Xitan ● Rex ● KIM ● EXORcisor . . . .*

"From now on, **PRINT-OUT takes on a new meaning"**

Direct International Sales:
International Sales Division
17648 Orna Drive
Granada Hills, CA 91344, USA

Discounts Available to
EDUCATIONAL ACCOUNTS
Dept. No. CC 1-74 **PO Box 8394**
***Ann Arbor.* MI 48105 (313) 665-8514**

M30
micro computer devices inc.
960 E. Orangethorpe, Bldg. F
Anaheim, California 92801
Telephone (714) 992-2270

mcd

"Innovators to the Microcomputer Industry"

See us at Booth # 107 at NCC **CIRCLE 163 ON READER SERVICE CARD**

Strings and Things: BASIC string manipulations

J. Tom Badgett

If you're one of those software experimenters with a desire to learn more about BASIC, take this article, go directly to your computer, do not pass GO...and have fun!

STRINGS & THINGS: Basic String Manipulation

My computer should do all the work it can. Judging from the software available for most microcomputers and the operating systems many companies design, I may be in the minority. Nevertheless, I do everything I can to ensure that all my own software includes check routines, redundancies and hand holding; so, even months later, I can run a program without having to list it first or refer to a printed manual for instructions.

If I make a mistake (which I do more often than not), I expect my computer to be smarter than I am. It should be able to catch my mistakes, tell me what I did wrong, and prompt me in correcting the error. BASIC has some useful functions to help a programmer install these kind of routines in his software. A complete tutorial on data checking and hand holding is beyond the scope of this article, but I'd like to cover in some detail how I use BASIC's string functions to improve my software.

J. Tom Badgett, 400 Albemarle St., Bluefield, W. VA 24701.

I'm using Ohio Scientific Instrument's 9-digit BASIC, written by Microsoft. It uses fairly standard commands and functions (very similar to the Altair BASIC which was almost a standard in microcomputing for so long; the OSI BASIC also is similar to the Radio Shack Level-II BASIC). Refer to Table I for a list of the functions we'll be discussing. You can use this information to convert to your own BASIC.

Table I

Function	Description
ASC(X$)	Returns the ASCII value, in Decimal, of the first Character in the string.
CHR$(I)	Converts the ASCII value of a letter, number or symbol to the proper letter, number or symbol. A numerical value for I results in the character the decimal value of I represents.
LEFT$(X$,I)	Gives the leftmost I characters of X$. Begins reading X$ from the left and forms a new string with the length of I.
RIGHT$(X$,I)	Works the same as LEFT$, but reads from the rightmost side of the string, X$.
MID$(X$,I,J)	Forms a new string from X$ by reading X$ beginning at the character I spaces from the left of the string and continuing for J characters. If the value of J is omitted it will read to the end of the string beginning with the Ith character.
LEN(X$)	Gives the length of X$ in Bytes. If X$ has five characters then LEN(X$) = 5.
STR$(X)	Converts a number to a string. If X = 3 then STR$(X) forms a string of "3".
VAL(X$)	Opposite of STR$(X). Converts a string to a number. If X$ = "3" then VAL(X$) = 3.

A Definition Please

First, what is a string? It can be considered a statement, usually defined by quotation marks, that the computer takes literally. That is, the computer will accept a string statement as you define it, store it away, print it on command, etc., but performs no calculations on the string.

Consider the program line:

```
10 PRINT "THIS IS AN EXAMPLE OF A STRING."
```

The information enclosed in quotes in the above example is a string. If this string information is something you will be using frequently in your program, you may define it further so programming will be easier:

String variables can be added; they can be stored and recalled; they can be printed; they can be compared.

```
10 A$="THIS IS AN EXAMPLE OF A STRING."
20 PRINT A$
```

The string statement is defined in line 10, using the variable "A" and the string identifier "$." Hereafter in the program, "A$" always will equal "THIS IS AN EXAMPLE OF A STRING." unless it is changed to something else. If the first example were changed to:

```
10 PRINT "5 + 3"
```

The computer will print exactly what is between the quotation marks (5 + 3) and not the computation of five plus three (8).

Except for this very important difference, string statements and string variables can be used in BASIC programs like any other variable. String variables can be added; they can be stored and recalled; they can be printed; they can be compared. This, then, gives the programmer a powerful tool for program development. Next, consider this example:

```
10 INPUT A
```

When this statement is encountered in a program everything comes to a halt while the computer waits for input from the keyboard or other input device. When a numerical variable such as "A" is asked for, any alphabetic characters will not be accepted. If letters are input in response to the INPUT A statement, BASIC will return something like REDO FROM START. After the number is entered you can compare it for size (too large or too small), or you can compare it to another known value, but that's about the only checking you can do with a numerical value.

I prefer to use a string INPUT, even if I'm looking ultimately for a numerical value. This increases program versatility';

```
10 INPUT A$
20 IF A$="HELP" THEN GOSUB 2000:GOTO 40
30 IF A$="MENU" THEN 1000:REM
    PROGRAM CHOICES
40 A=VAL(A$)
```

The numerical value the program is seeking is input in line 10 as A$. If I want to jump to another area of the program, an INPUT statement of this form gives me a chance. Suppose I'm into the program and realize it is the wrong one, or that I've forgotten how to enter the data. With an INPUT statement structured as a string I can build into the program a wide variety of options. In line 40 the string is converted to a number for further manipulation by the program.

I use the same strategy for invoices and purchase orders. When my invoice printing program asks for the quantity (a value the program uses to figure the extended price) the quantity is entered as a string. This allows me to answer the computer's prompt, "QUANTITY?," with "2 Boxes" or "3 cases" when items are priced and delivered by the box or case. When the string is converted to a number with the VAL statement, BASIC strips off the number (2 or 3 in the examples above) and uses that value in its computations. You might wish to add some additional coding, however, to check for an entry that has no numerical value. Such an entry would return a zero as the cost of an item (0 boxes times a unit price will give 0). Line 50 below will request additional input when a zero value is detected in the string;

```
40 INPUT A$
50 IF VAL(A$)=0 THEN PRINT
     "INVALID-REENTER:GOTO 40"
```

Again, by using string input you have the option of adding additional coding to allow a jump to another portion of the program. With the invoice printing program, suppose you discover you've made an improper entry only after typing RETURN. With the proper coding you could type REPEAT on the next input statement and the previous sequence would be erased and you would have a chance to enter the information again.

BASIC's ability to manipulate strings is truly amazing and helpful.

String Manipulations

Now, perhaps, you're beginning to see the value of using string input statements. But this is only the beginning. BASIC's ability to manipulate strings is truly amazing and helpful. One of the uses frequently suggested for a microcomputer is mailing list maintenance...just the kind of redundant, repetitive work a computer does well. With the proper use of BASIC's string functions you can enhance your mailing lists. If you want to use your mailing list to send personalized letters to a number of individuals you can write a program to search the data files for the names, print the heading of the letter, then use the string functions to construct a salutation from the full name in the address list. A portion of such a program is reproduced in Listing I.

This routine uses what may be one of the most powerful and useful of all the string functions, the MID$. The MID$ function usually takes the form: MID$(A$,I,J). This constructs a new string from A$ by looking at A$'s Ith character and reading for J characters. That's not as complicated as it sounds. Consider this string:

```
A$="TESTING"
  1234567
```

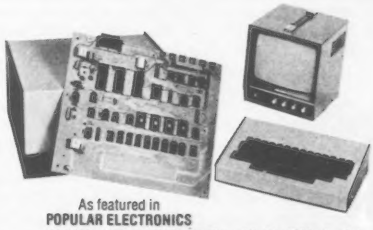

Build The World's Most Powerful 8-Bit Computer

Featuring The Famous Intel 8085!

Explorer/85™

Starting for just $129.95 you can now build yourself a sophisticated, state-of-the-art computer that can be expanded to a level suitable for industrial, business and commercial use. You learn as you go. . . in small, easy-to-understand, inexpensive levels!

- ***Features Intel 8085 cpu/100% compatible with 8080A software!***
- ***Onboard S-100 bus (up to 6 slots)!***
- ***Onboard RAM and ROM expansion!***
- ***Built-in deluxe 2K Monitor/Operating ROM!***
- ***Cassette/RS 232 or 20 ma./4-1/2 8-bit parallel I/O and timer all on beginner's Level "A" system!***



As featured in
POPULAR ELECTRONICS
EXPLORER/85 shown with Video Monitor and Keyboard/Video Terminal.

EXPLORER/85 gives you "big computer" features immediately, without turning you into an appliance operator, doomed to run pre-developed software for life. Simply connect EXPLORER to a terminal, video monitor or tv set and 8 volt power supply and start running programs, the very first night! Level "A" teaches you machine language and computer fundamentals. It lets you run exercise programs including programs to examine the cpu registers, examine memory, fill memory, move memory and make up games. You can load and play back these programs on an ordinary tape cassette—and display your efforts on any tv screen, video monitor or printer. ($8.95 RF modulator required for tv use.) The simplified architecture of the Intel 8085 makes EXPLORER far easier to understand than computers using the older, more complex but less powerful 8080A. Then, when you're ready, EXPLORER can be expanded—by you—to rival the power of any 8-bit computer on earth. Or you can customize it to perform a dedicated task, thanks to onboard prototyping, RAM and ROM expansion capabilities.

LEVEL "A" SPECIFICATIONS
EXPLORER's Level "A" system features an advanced Intel 8085 cpu, which is 50% faster than its 8080A predecessor, yet 100% compatible with 8080A software. . . which, you'll discover, exists by the ton. "Big computer" features include an 8355 ROM with 2K deluxe monitor/operating system which has two programmable 8-bit bi-directional parallel I/O ports, built-in cassette interface with tape control circuitry to allow labeling cassette files, and commands which include: "display contents of memory," "run at user location (go to)," "insert data," "move contents of memory," "examine registers individually or all," fill command (to fill the contents of memory with any variable), automatic baud rate selection, programmable characters per line display output format, and more! An 8155 RAM—I/O chip contains 256 bytes of RAM, two programmable 8-bit bi-directional and one programmable 6-bit bi-directional I/O ports plus programmable 14-bit binary counter/timer, user interrupt and reset switches. Onboard expansion provisions exist for up to six S-100 boards, 4K of RAM and 8K of ROM, PROM or EPROM.

CHOICE OF HEX KEYPAD OR TERMINAL INPUT
If you plan to customize EXPLORER for dedicated use, we recommend that you order hex keypad input. But, if you are planning to go whole hog and blow EXPLORER up into a full size, state-of-the-art system with 8K or extended basic (coming soon), up to 64K of memory, floppy disks, telephone interface, printers, and all sorts of S-100 plug-ins—you'll be better off with the Keyboard/Video Terminal input. The $149.95 EXPLORER Keyboard/Video Terminal includes full ASCII decoding with 128 ASCII upper/lower case set, 96 printable characters, onboard regulators and selectable display formats—32x16 for tv set or 64x16 for video monitor (not included).

EXPAND EXPLORER, LEVEL-BY-LEVEL
Level "B", at $49.95, adds S-100 signals plus onboard RAM/ROM decoding. Includes all parts necessary to generate the signals for S-100 bus accessories. Just add two S-100 bus connectors and you have a complete S-100 compatible computer with a world of add-ons at your fingertips. Choose from hundreds of products to satisfy your individual needs. Level "B" kit also includes the address decoders for onboard RAM and ROM expansion, which are addressable anywhere in the 65K field.

Level "C" expansion, at $39.95, expands the S-100 bus to allow a total of six S-100 cards to be plugged into EXPLORER's motherboard and contained in EXPLORER's steel cabinet. Includes all hardware, mounting brackets, board guides, etc. Just add the number of S-100 bus connectors you need.

Level "D" expansion, at $69.95, gives you 4K of onboard static RAM utilizing 2114 IC's. Your board will also accept four 2716 EPROM's, which can be purchased separately. You now have an advanced mainframe that can be customized with the peripherals of your choice to fit any (or all) specific requirements. Each level of EXPLORER is separately regulated for the ultimate in stability. Factory service is available from Netronics. **Order your EXPLORER today!**

ORDER FROM THIS COUPON TODAY!

Netronics R&D Ltd., Dept CC6, 333 Litchfield Road, New Milford, CT 06676

- ☐ Level "A" EXPLORER/85 kit (specify ☐ terminal or ☐ hex keypad input), $129.95 plus $3 p&h.
- ☐ Power Supply kit, 5 amp, ±8 volt, $34.95 plus $2 p&h.
- ☐ Intel 8085 User's Manual, $7.50 ppd.
- ☐ ASCII Keyboard/Video Terminal kit, $149.95 plus $3 p&h.
- ☐ Hex Keypad kit for hex version, $69.95 plus $2 p&h.
- ☐ Level "B" S-100/Onboard RAM/ROM Decoder kit (less S-100 connectors), $49.95 plus $2 p&h.
- ☐ Level "C" S-100 5-Card Expander kit (less connectors), $39.95 plus $2 p&h.
- ☐ S-100 Bus Connectors (gold), $4.85 each.
- ☐ Level "D" 4K Onboard RAM kit, $69.95 plus $2 p&h.
- ☐ Deluxe Steel Cabinet for EXPLORER/85, $39.95 plus $3 p&h.
- ☐ Deluxe Steel Cabinet for Keyboard/Video Terminal, $19.95 plus $2.50 p&h.
- ☐ RF Modulator kit, $8.95 ppd.
- ☐ Total Enclosed (Conn. res. add tax) $_____
- ☐ VISA ☐ Master Charge Exp. Date _____

Account # _____

PHONE ORDERS CALL (203) 354-9375

Print
Name _____

Address _____

City _____

State _____ Zip _____

DEALER INQUIRIES INVITED

CIRCLE 200 ON READER SERVICE CARD

Strings, con't....

Listing I

```
50 N$="Mr. John Jones"
100 FOR J=LEN(N$) TO 1 STEP -1
110 N1$=MID$(N$,J,1)
120 IF N1$=" " THEN 450
130 NEXT J
450 IF MID$(N$,4,1)="." THEN N=5: GOTO 500
460 IF MID$(N$,4,1)="s" THEN N=5: GOTO 500
475 N=4
500 N2$=LEFT$(N$,N)+RIGHT$(N$,LEN(N$)-J)
510 PRINT "Dear ";N2$;":"
```

Line 50 introduces N$, a value which likely would come from a disk file or some other part of the program. At line 100 the dissection of the string begins. Line 100 sets up a loop which will execute for the number of characters in N$ in descending order. Line 110 establishes a second string N1$, which is the single character in N$ at location J. N1$ will equal "s" the first time through the loop, "e" the second time, etc. until the space before the last name is encountered. Then line 120 will cause a jump to line 450 where a check is made for a period. If the period occurs 4 characters over from the beginning of the string, then the first word is "Mrs." and line 500 must construct a string using the first five characters in the string ("Mrs." plus a space). A check is made in line 460 for the title "Miss". If the fourth character in the string is "s" then again five characters are stripped off the original string to form the new string to be used in the salutation or in the body of the letter ("Miss" plus a space). If there is no period then the first word must be "Mr." or "Ms." and the first part of the string need only be four characters long ("Mr." or "Ms." plus a space). N is set to 4 in line 475 before the new string is constructed with the LEFT$ and RIGHT$ functions in line 500. You can use many variations of this technique to search a string for certain characters and to build new strings from an original string. Line 510 shows how you might format the newly formed string for use in the salutation of the letter.

This string, A$, has seven characters as I've indicated with the numbers under the string, "TESTING." The numbers are not actually a part of A$. Now, if the following program is executed, B$ is found to be "TING."

```
10 A$="TESTING"
20 B$=MID$(A$,4,4)
30 PRINT B$
```

MID$(A$,4,4) started with the fourth character of A$, the second T in this case, and read for four characters to form the new string, B$. You could achieve the same results in this example by replacing Line 20 with; B$ = MID$(A$,4). When the value of J in the MID$ function is eliminated it reads to the end of the specified string.

This string function is useful in changing names in a mailing list as in Listing I. By applying a MID$ search to a name you can construct another string to use as the salutation. With the program in Listing I you can start with a string that is a full name, such as Mr. John Jones, and construct a new string such as Mr. Jones or John to use in the body of your letter.

Two more common string operators work similarly. The LEFT$ and RIGHT$ functions are used when you want to strip off a portion of a string beginning at the right or left side for a specified number of characters. In the previous program example, B$ could have been constructed to equal "TING" using the RIGHT$ function:

```
10 A$="TESTING"
20 B$=RIGHT$(A$,4)
30 PRINT B$
```

Again, B$ = "TING" because the RIGHT$ and LEFT$ functions start with the rightmost or leftmost character in the string and read for the number of characters specified. If B$ = LEFT$(A$,4) then B$ = "TEST." These can be used when you don't want the versatility of looking at a single character at a time, as is necessary with the routine in Listing I. RIGHT$ and LEFT$ work well, however, only if you want to compare the first or last character in a string or the first several or last several characters in a string. This is sometimes the case when the computer asks for a "YES" or "NO" answer. Rather than comparing A$ to "YES" and "NO," I use the following form:

```
10 INPUT "DO YOU WANT TO CONTINUE";A$
20 IF LEFT$(A$,1)="Y" THEN 1000
30 IF LEFT$(A$,1)<>"N" THEN PRINT
     "I'M SORRY,";:GOTO 10
40 PRINT "OK.  THANKS.": END
```

With this form, you don't have to answer with a full "YES" or "NO." Also, I've included in the example a simple "check" routine to look for undefined input. Here the program is looking for either a "YES" or a "NO." If the operator accidentally enters something else, the program would end if you didn't have line 30.

From Numerical to Alpha and Back and Back Again

There are other string functions you may not use as frequently as MID$, LEFT$, and RIGHT$, but they, too, are useful. VAL(A$) returns a number value of A$. If A$ = "10" then VAL(A$) = 10. If A$ = "TEST" then VAL (A$) = 0 because words don't have numerical significance. In fact, the VAL(A$) function can be used anywhere the value A can be used. If A$ is a negative number, VAL(A$) will return a negative number. If, however, A$ = "+22," VAL(A$) is simply 22, without the plus sign.

The inverse of the VAL(A$) function is the STR$(A) function. If A = 22 then STR$(A) returns a string which is "22." Consider the following program lines:

```
10 A=22
20 A$=STR$(A)
30 PRINT A$
```

At line 30 the program would print 22, which is the value of A$. Why would you ever want to convert a number to a string? I use this function when I want to search for a number or if I want to modify a number. Once the number is converted to a string, remember, you can apply the MID$ search to it and examine individual digits in a long number. This technique sometimes is helpful in program security or in generating a random number. Example:

```
10 A=23450
20 A$=STR$(A)
30 B=VAL(MID$(A$,2,2))
40 C$=LEFT$(A$,1)
50 OPEN "KEY"+C$,1
60 PN=VAL(RIGHT$(A$,LEN(A$)-1))
```

With this routine you can start with a number, A (returned from another part of the program), and create a random number, B, to use in computations somewhere else. Then you can construct C$ from A$ (line 40) and use this as an identifier for a data file. In line 50 the command OPEN "KEY" + C$,1 opens a data file with the name "KEY3." In this manner you can reduce the length of data files you have to search for information by catagorizing them according to the leading number returned in the value A. I have an inventory program, for example, that classifies inventory into 5 classes. The part numbers for these parts always start with a 1,2,3,4 or 5, depending on which class they fall in. Once that class number is stripped off, the actual part number becomes the number that is left (line 60 in the example above).

This sample program routine introduces other string concepts. First, in line 50, notice that the string "KEY" can be added to C$ (or vice versa) to form a new string. We could have added another program step at line 45: K$ = "KEY." Then line 50 would have become: 50 OPEN K$ + C$,1. Either way, the strings would be added. Suppose the program were set up for data file names with a dash before the number. then use a statement like:

```
50 OPEN "KEY-"+C$,1
```

or like this:

```
50 OPEN K$+"-"+C$,1
```

Either form would give a file name of "KEY-2." Notice the use of the VAL statement in line 30 coupled with a MID$ search. If you're careful about placement of parentheses you can "nest" such functions as much as you wish. Line 60 is an example of this nesting and also introduces another string function, LEN. Remember that we want to strip off the leading

number to use as a class number to determine which data file to open. That is done in line 40. Now the rest of the number must be isolated for use as the part number. By doing it like the example in line 60, you're not limited to a certain number of characters in the string. Starting at the right of the string, the computer searches all the characters in the string except the left most character and forms a new string, which is then converted to a number, PN, via the VAL function. LEN returns the length of the string, so a string that is a number of five digits has a length (LEN) of five. In this example, we don't want the first number in the string, so I've specified a search for the length of A$-1 (LEN(A$-1)). Line 60 in this example could have been written like this:

```
60 PN=VAL(MID$(A$,2))
```

The LEN function counts spaces as part of the length of the string, so that a string, "THIS IS A STRING," has a length of 16. Another reason for using string input in the inventory example above is the ability it provides of using alphabetic as well as numeric codes for the part numbers.

LEN returns the length of the string, so a string that is a number of five digits has a length (LEN) of five.

There are two more commonly used string functions we haven't discussed: CHR$ and ASC. You've probably seen CHR$ used in some programs. It is a convenient way of printing a character from a program variable and for sending control codes to a terminal or printer. It takes the form (CHR$(I), where I is the numerical representation of an ASCII character in decimal. The character "A," for example, is 65 in decimal, so if the computer sees a program line like this:

```
10 PRINT CHR$(65)
```

the letter "A" will be printed.

You may have seen programs that use the CHR$ function with a table of variables to print a message, such as a program heading, without using conventional PRINT statements. Programmers sometimes use this technique when they want to make it difficult for anyone to strip off their copyright statement or other information at the head of the program run. Consider this program:

```
5 DIM L(34)
10 FOR J= 1 TO 34
20 READ L(J)
25 PRINT CHR$(L(J));
30 NEXT J
40 END
50 DATA 84,72,73,83,32,73,83,32,65,32
60 DATA 84,69,83,84,32,79,70,32,84,72
70 DATA 69,32,85,83,69,32,79,70,32,67
80 DATA 72,82,36,46
```

This program demonstrates how the CHR$ function works. The data statements contain the decimal ASCII values of letters and symbols. These values are read in a loop in line 20, then converted to their alphabetic or symbolic form with the CHR$ function. The message that results is: THIS IS A TEST OF THE USE OF CHR$. Many printers and video terminals use ASCII control codes to change certain operating parameters. In this case the CHR$ function can be used as part of a BASIC program to turn off and on these operating options.

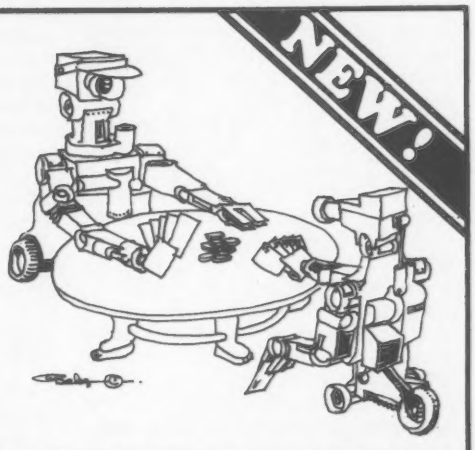
The ASC string function can be considered the opposite of CHR$. It returns the ASCII value of the first letter in a string, so that if A$ = "TEST," ASC(A$) would be 84. Computers with graphics capabilities frequently use this function to print letters or symbols in specific positions on the screen. By breaking a string down into individual letters (using the MID$ function), you can POKE the ASCII value of the string away in a specific memory location, either a video memory or simply any portion of RAM. See Listing II and III for short programs you can have some fun with. They demonstrate both the ASC and CHR$ BASIC functions in a way that could be used as a code for computerists to communicate with each other.

Listing II

```
10 A$="TEST*"
20 X=1
30 A(X)=ASC(MID$(A$,X,1))
35 IF A(X)=42 THEN 45
40 X=X + 1: GOTO 30
45 I=1
50 FOR J= 8000 TO 8000+X
60 POKE J,A(I)
65 I=I + 1
70 NEXT J
100 DISK!"SA 50,1=8000/1
110 END
```

Line 30, Listing II, searches the string defined in 10 and converts each letter to its ASCII equivalent. Line 35 checks for the string limiter "*", and dumps out of the closed loop when it is found. Lines 50-70 POKE these values away in a free portion of memory. Line 100 puts the information away on disk. By prearranging with someone else which track of the disk the information is on and the length of A$, you could use the

More Basic Computer Games



Our fabulous new book, **More Basic Computer Games**, brings you 90 brand new games in Basic, ready to run on your computer. Some have been published in Creative Computing magazine but most are completely new!

Includes space games like Close Encounters, Deepspace and ICBM. Or match wits with Lewis Carroll, evade a man-eating rabbit, become a millionaire, race your Ferrari, play a tennis match, throw mud pies at a schmoo (who throws back), crack a safe, joust with the evil black knight, or trek across the desert on your camel.

More Basic Computer Games has complete listings and sample runs in large type, along with thorough descriptions of every game. Large format paperbound, 192 pages. $7.50 plus $1.00 shipping and handling in U.S. ($2.00 foreign). NJ residents add 5% sales tax. Send your order and payment to Creative Computing, P.O. Box 789-M, Morristown, NJ 07960. Visa, MasterCharge and American Express okay. For faster service, call in your bankcard order to:

800-631-8112

(In NJ, call 201-540-0445)

Strings, con't....

Listing III

```
10 X=4:   REM  LENGTH OF A$
15 DISK!"CA 8000=50,1
20 FOR J= 0 TO X-1
30 PRINT CHR$(PEEK(8000 + J));
40 NEXT J
50 END
```

program in Listing III to recall the hidden information and print it out. This is not really a super secret code, but it'll help you understand the ASC and CHR$ functions. You can probably see the value of this kind of disk routine when writing software you hope to sell. Somewhere in the depths of your program stick away a routine similar to this one, using for A$ some command or instruction within the body of the program. You can key the disk to specific users this way or check for unauthorized copying of the program.

Making Comparisons

We've covered the usually available string functions in BASIC. Let's consider some of the finer points of their use. Remember at the beginning I said strings may be manipulated in much the same way as numerical variables. The operators =, <, >, <=, >=, and + may be used with strings as you would use them with numbers. There are some conventions to remember, however, that make strings behave slightly differently from numbers.

In using the "<"and">" comparators, remember that the length of the string is the determining factor. The string "A," thererore, is shorter than the string "A," since trailing spaces are considered in determining string length. If you are using strings in data statements and plan to compare them for length, you might wish to put each string inside quotes as part of the data statements, even though this is not normally necessary for the data statements to function properly. By enclosing data statements with strings in quotes, leading spaces will be retained and BASIC's string limiters won't operate on the string. Check your BASIC manual for details on string limiters. The Microsoft BASIC I'm using automatically limits a string when it sees a comma (,) or a colon (:). There are ways around this problem if you're not using a ROM BASIC. With the Ohio Scientific Instruments OS 65U disk operating system, for example, the following program lines will allow commas and colons to be included in strings:

```
10 POKE 2972,13
20 POKE 2976,13
```

This is useful when entering city and state information from the keyboard. If your program doesn't need to keep these two variables separate you'll have to construct a third string from the city and state, or store the data away as two separate strings. By POKEing off the string limiters you can enter such data, complete with commas, in a single string. You probably can find a similar POKE to turn off string limiters in your BASIC.

Disk Data Files

Pay special attention to handling of string information with disk data files. Generally, it is desireable to completely fill a data field even if the string to be stored there isn't as long as the field established for it. If your operating system doesn't handle this housekeeping chore automatically, add spaces to string data being written to disk files to erase previous information in that field and to ensure that all strings from the same field in different records are the same length. You'll need to do the same thing when searching a data field for information stored as string information. If your program asks the operator to INPUT a string to be used for comparison, the next line in the program must fill out the string to the length of the data field, otherwise the trailing spaces in the string stored on disk will denote a different string from the one being sought. Perhaps an example will make this idea clearer.

Suppose one of your data fields is 10 characters long. To write a string shorter than 10 characters to the disk in this field, you should add spaces to the string to make it 10 characters long before it is written to the disk:

```
10 A$="TEST"
20 IF LEN(A$)<10 THEN A$=A$+" ":GOTO 20
```

Then write the information to the proper field. By adding spaces to all strings written to the same field in different records, all strings in that field will be the same length. Do the same thing when searching for a string in that field:

```
10 INPUT "STRING FOR SEARCH";A$
20 IF LEN(A$)<10 THEN A$=A$ + " ": GOTO 20
```

When the computer begins checking the disk files for comparison, the string you have asked it to find is always the same length as the one in the field it is searching.

You might want to use some "special case" comparisons with the strings. Just be sure to try out these examples with your version of BASIC to be sure they function the same way as with the Microsoft version I'm using. I've already shown some examples using IF/THEN comparisons with strings. What about a program line like: IF A$ THEN 200? In this case the program will jump to line 200 only if A$ has something in it. That is, if A$ is anything but " " (space) a jump will occur. You can check for numerical value by using: IF VAL(A$) THEN 200. In this line, a jump will occur on any value of A$ except zero. You may use the AND function with VAL(A$) in a similar way: IF VAL(A$) AND VAL(B$) THEN 200. This statement can be useful if you want to determine whether a string has numerical value or contains only text. If either A$ or B$ is text, then the result of the AND operation is zero and no branch will occur. Indeed, a jump happens with this statement only when the value of the AND operation is something other than zero. This is another somewhat sneaky operation to help throw would-be program stealers off the track. It can be extremely difficult to determine exactly what the programmer was looking for in these statements.

Finally, you can use the NOT function in the same way: IF NOT VAL(A$) THEN 200. Any value of A$ greater than or equal to zero, less than or equal to -1 will cause a jump to 200. You can use a statement like this to look for a value between zero and -1, either returned from another part of the program or used as a trace element or security technique in your program.

Summary

BASIC handles alphabetic information well—better than some other high level languages. Sometimes, however, it is easy to forget this fact as we program from a numerical orientation. I have found that using strings in my programs makes them more versatile, easier to adapt and more user-oriented. As computers proliferate, the ability of software to help the user and make computer use easier will become more and more important. There's little excuse any more for programs that ask for user input in this form: "TYPE 1 FOR YES AND 0 FOR NO," which was common in the early days of microcomputing. Memory prices are low enough that users can afford to use strings and not worry about space conservation as much as before.

Become familiar with the string functions of your BASIC—then use them. Programming is more fun and the computer is easier to use. □

MAD HATTER SOFTWARE

WE SURE DO ALICE. BESIDES OUR OWN EXTENSIVE LINE, WE CARRY SOFTWARE FROM PERSONAL SOFTWARE, SMALL SYSTEM SOFTWARE, 80-US, CREATIVE COMPUTING, MICROSOFT, TRS-80 SOFTWARE EXCHANGE, SOFTAPE, CIRCLE ENTERPRISES AND MANY OTHER SOFTWARE PUBLISHERS.
A STRANGE CATAPILLER SENT ME HERE. HE TOLD ME THAT YOU HAVE SOFTWARE FOR MY MICROCOMPUTER.
MH
IN SHORT ALICE "WE'VE GOT IT ALL"

PROGRAM	DESCRIPTION	TRS-80 L1/2	TRS-80 L2	APPLE	PET	PRICE
GALACTIC BLOCKADE RUNNER	• AN EXCITING SPACE WAR GAME WITH GRAPHICS	•	•	•	•	$ 9.95
SCI-FI GAME SAMPLER	• 3 GAMES—LUNAR LANDER—STAR MONSTER—SPACE BATTLE	•	•	•	•	$ 7.95
R/T LUNAR LANDER	• A REAL TIME LUNAR LANDER WITH GRAPHICS		•	•		$ 7.95
MICRO-TEXT EDITOR	• FORMAT TEXT—SAVE & LOAD TO TAPE—OUTPUT TO PRINTER		•	•		$ 9.95
OTHELLO III	• A STRATEGY BOARD GAME—PLAY AGAINST COMPUTER OR OTHERS	•	•	•	•	$ 7.95
AIR RAID	• A REAL TIME, ARCADE TYPE SHOOTING GAME IN MACH. LANG.	•				$ 14.95
MICRO-CHESS	• PLAY CHESS WITH YOUR COMPUTER—VARIOUS LEVELS OF DIFF.	•	•	•	•	$ 19.95
BRIDGE CHALLENGER	• DON'T WAIT FOR OTHERS TO PLAY—YOUR COMPUTER'S READY	•	•	•	•	$ 14.95
APPLE 21	• BLACKJACK WITH HIRES GRAPHICS			•		$ 9.95
STAR WARS/SPACE MAZE	• SCI-FI GAMES FOR THE APPLE			•		$ 12.95
RENUMBER	• RENUMBER YOUR BASIC PROGRAMS—RENUMBERS EVERYTHING	•		•		$ 14.95
DISK RENUMBER	• SAME AS ABOVE, BUT ON DISK	•				$ 19.95
PILOT 2.0	• THE EDUCATIONAL LANGUAGE. IN MACH. LANG.—INC. EDITOR		•			$ 14.95
PILOT 3.0	• THE DISK VERSION OF THE ABOVE		•			$ 24.95
APPLE TALKER	• YOUR APPLE SPEAKS! NO NEW HARDWARE REQUIRED			•		$ 15.95
APPLE LIS'NER	• SPEECH RECOGNITION THE EASY WAY—GREAT WITH THE TALKER			•		$ 19.95
TIC-TAC-TALKER	• TIC-TAC-TOE USING SPEECH SYNTHESIS AND RECOGNITION			•		$ 19.95
FORTRAN	• FOR THE TRS-80—SEE MICROSOFT'S ADS		•			$325.00
SYSCOP	• MAKE BACKUP TRS-80 SYSTEM TAPES THE EASY WAY		•			$ 9.95
ANDROID NIM-2	• GAME OF NIM WITH ANIMATED ROBOTS AND SOUND		•			$ 14.95
SNAKE EGG	• A BETTING GAME WITH ANIMATED SNAKES AND SOUND		•			$ 14.95
LIFE 2	• 100 GEN. PER MIN. LIFE & BATTLE OF LIFE W/ANIMATION & SOUND		•			$ 14.95
DCV-1	• PUT SYSTEM TAPES ON DISK EVEN IF IN SAME MEM AS DOS		•			$ 9.95
MUSIC MASTER	• ENTER SHEET MUSIC—THE TRS-80 THEN COMPILES & PLAYS IT		•			$ 14.95
DISK MUSIC MASTER	• SAME AS ABOVE BUT ON DISK W/MANY SELECTIONS		•			$ 24.95
TRS-80 CP/M	• OPENS UP THE WHOLE WORLD OF CP/M SOFTWARE TO THE TRS-80		•			$150.00
PET ASTROLOGY	• DOES ALL THE COMPUTATIONS FOR YOU				•	$ 14.95
PERSONAL FINANCE PKG.	• KEEPS TRACK OF CHECKS, BUDGET, COMPUTES INTEREST	•		•	•	$ 9.95
TRS-80 DISK LIB. "A"	• 9 PROGRAMS ON DISK—INC. BLOC. RUN, OTHELLO ETC.		•			$ 39.95

BUSINESS AND APPLICATION SOFTWARE—CALL OR WRITE FOR DETAILS

16K MEMORY UPGRADE FOR TRS-80, APPLE & SORCERER COMPUTERS	$ 94.95
C-10 HIGH QUALITY DATA CASSETTES W/SCREW HOUSINGS	10/$ 34.95
VERBATUM 5-1/2 INCH BLANK DISKETTES	10/$ 10.00

10% OFF IF YOU ORDER 3 SOFTWARE PACKAGES OR MORE **SEND FOR FREE CATALOG—GIVE TYPE OF COMPUTER**

AVAILABLE FROM THESE FINE MICRO COMPUTER DEALERS

J&J ELECTRONICS LTD
28 COLLINGTON AVE.
BEXHILL-ON-SEA, E. SUSSEX, ENG.

HOBBY WORLD ELECTRONICS
19355 BUSINESS CENTER DR. #6
NORTHRIDGE CA 91324

CAPITOL COMPUTER SYSTEMS
3396 EL CAMINO AVE.
SACRAMENTO CA 95821

COMPUTER CABLEVISION, INC.
2617 42ND ST. NW #2
WASHINGTON DC 20007

COMPUTER VILLAGE
931 SW 87TH AVE.
MIAMI FL 33174

AUGUST AUTOMATION
28 MILK ST.
WESTBORO MA 01581

TRS-80 SOFTWARE EXCHANGE
17 BRIARCLIFF DR.
MILFORD NH 03055

KENNEDY SYSTEMS
74 BROAD ST.
LYNDONVILLE VT 05851

L. C. SALES
100 HINCHEY AVE. #705
OTTAWA, ONT., CAN. K1Y4L9

THE CPU SHOP
39 PLEASANT ST.
CHARLESTOWN MA 02129

OP AMP TECH BOOKS
1033 N. SYCAMORE AVE.
LOS ANGLES CA 90038

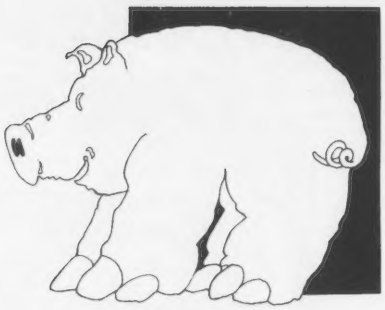
ADVANCED COMPUTER PRODUCTS
1310B E. EDINGER
SANTA ANA CA 92705

TO ORDER BY PHONE OR FOR DEALER INFO—CALL—(617) 682-8131
ADD 75c SHIPPING & HANDLING • MASS. RESIDENTS ADD 5% SALES TAX
MAD HATTER SOFTWARE • 900¢ SALEM RD • DRACUT, MA 01826

CIRCLE 191 ON READER SERVICE CARD

GREED: A Game Playing Program With Adjustable Skill Level

Ronald G. Ragsdale



In the Nov.-Dec. 74 issue of *Creative Computing,* the game of NOT ONE was described and readers were invited to create programs that played the game. In the intervening months a program to play that game has evolved at this institution, but under the name of GREED, which seems to be well suited to the game's characteristics. The rules of the game, as given to the players that request instructions, are shown below:

GREED IS A GAME FOR TWO PLAYERS. ON EACH OF THEIR TEN TURNS, THE PLAYERS THROW THE DICE AND ADD THE RESULT TO THEIR SCORES. PLAYERS MAY THROW THE DICE AS MANY TIMES AS THEY LIKE BUT IF THE FIRST RESULT OF THE TURN IS REPEATED, THEIR SCORE FOR THAT TURN IS ZERO.
THIS PROGRAM PLAYS AT VARYING SKILL LEVELS. IT PLAYS THE BEST AT LEVEL 100 (AVERAGE SCORE ABOUT 300) AND THE WORST AT LEVEL 0 (AVERAGE SCORE ABOUT 150).
GOOD LUCK!

The basic strategy of the GREED program is based on the comparison of the expected gain (probability of not repeating the first roll times the average of the "non-losing" rolls) from a particular roll of the dice with the expected loss (probability of repeating the first roll times the points already accumulated on this turn). As long as the expected gain is larger the program continues "rolling" the dice. A summary of this strategy appears in Table 1.

If the first roll is a	2	3	4	5	6	7	8	9	10	11	12
Keep rolling until the points for the turn exceed	252	123	80	58	44	35	42	54	74	115	240

Table 1. The basic GREED Strategy.

In an effort to manipulate the success rate of the program a "skill level" was introduced so that at skill level=100 the program followed the strategy of Table 1, but at skill levels=N, it altered its goal (the lower line of Table 1) by (100-N)%. Thus at skill level=0, the program either played an extremely conservative (all goals=0) or extremely reckless (all goals doubled) game (randomly determined on a per-game basis).

The straightforward application of this basic strategy led to situations where the program behaved in a silly manner, so that the following three sub-strategies were added:

1. The program takes advantage of the fact that it plays last and, on the last turn, stops rolling when it reaches a winning score.

Ronald G. Ragsdale, The Ontario Institute for Studies in Education, 252 Bloor Street, Toronto, Ontario, Canada M5S 1V6.

2. In order to temper the reckless play at low skill levels, the program stops "rolling" if it is at least 100 points ahead and has accumulated at least 100 points (250 if the first roll was a 2 or 12) on this turn.

3. In order to adjust to the progress of the game, the setting of the goal for a particular turn is modified if either player is sufficiently far ahead (defined as 50 times the number of remaining turns). If the program is ahead by that amount it halves the calculated goal and if it is behind it sets a lower limit of 50 on the goal.

The additions of the sub-strategies led to an obvious improvement, but it also attenuated the effect of "skill level" by improving the lower levels more than the higher ones.

Because of the uncertainty about the effects of the sub-strategies and because the recently installed DECsystem-10 was not heavily loaded, the GREED program was evaluated against another program. The program used in the comparison was NOT ONE, which appeared in the Mar.-Apr. '75 issue as one of the best programs to be received in response to the previously mentioned invitation.

The strategy of NOT ONE is similar to the basic strategy for GREED, but is based on the number of rolls in a turn rather than the number of points. The strategy is summarized in Table 2.

If the first roll is a	2	3	4	5	6	7	8	9	10	11	12
Keep rolling until the number of rolls =	18	18	9	9	6	6	6	9	9	18	18

Table 2. The basic strategy for NOT ONE.

Except for initial rolls of 2 and 12 the two strategies are quite similar; the expected value for 18 rolls is 126, for 9 rolls 63 and for 6 rolls 42. Since 2 and 12 each occur with probability=1/36, the results for the two strategies are essentially the same.

Comparisons were made between the NOT ONE program and eight versions of the GREED program. The eight versions consisted of the basic strategy (shown in Table 1) and all possible combinations of the three sub-strategies. In each comparison, 1000 games were played at each of 11 different GREED "skill levels" ranging from 0 to 100 in multiples of 10.

The results of these comparisons are summarized in Table 3. It can be seen that the basic strategy wins from 34 to 50.5% of the games, while the additions of the sub-strategies can alter the range so that GREED wins a minimum of 50% and a maximum of about 61% depending on the skill level. In any case the difference between the percentage of games won at the highest and lowest skill levels is relatively constant at about 15-20%.

Strategies	skill level 0	50	100
basic plus 1, 2 & 3	50	56	61
basic plus 1 & 2	50	56	64
basic plus 1 & 3	42	54	60
basic plus 1	43	51	60
basic plus 2 & 3	46	48	50
basic plus 2	45	47	53
basic plus 3	36	44	51
basic	34	48	47

Table 3. Games won by GREED at various strategy and skill level combinations when playing against NOT ONE. Scores, as percentages, are based on 1000 games at each combination.

The initial reaction to these results was to try and redefine "skill level" in terms of various combinations of sub-strategies, in order to increase the "ability range." Fortunately, serendipity reared its lovely head before this could be accomplished and the solution became much simpler.

The fortuitous event occurred when the program to compare all strategy GREED with NOT ONE was being recoded into regular DECsystem-10 BASIC. During the recoding a test within sub-strategy three was inverted so that 50 points was set as a maximum (rather than minimum) goal when the GREED program was losing by a sufficient amount. The result of the comparison between this version and NOT ONE is shown in Table 4. In this comparison, based on 2000 games at each skill level, the percentage of games won by GREED varies from 31 to 58%.

Greed skill level	0	10	20	30	40	50	60	70	80	90	100
Percentage of games won by GREED	31	34	40	45	50	51	55	55	56	58	55

Table 4. Games won by GREED (where strategy 3 is modified) at various skill levels when playing against NOT ONE. Scores, as percentages, are based on 2000 games at each combination.

The final choice was to use the inverted strategy for the lower skill levels (0-59) and the regular strategy for the higher levels (60-100). The hope that this would result in an increased range of ability for GREED was tested by playing 10,000 games against NOT ONE at each of levels 0, 10, 90, and 100. The results indicated a range of about 29 percentage points, as shown in Table 5.

GREED skill level	0	10	...	90	100
Percentage of games won by GREED	30.0	34.1	...	59.3	59.2

Table 5. Games won by the final version of GREED playing against NOT ONE at skill levels of 0, 10, 90, and 100. Scores, as percentages, are based on 10,000 games at each combination.

Other improvements could be made in the GREED strategies, but the variability of the results makes the improvements difficult to detect. One possibility is to let the player insert his strategy as a subroutine and give the results of playing 1000 games against a particular skill level of GREED, This would reduce variability but might reduce interest in the game, as well as limiting the number of possible players (and increasing CPU time). Therefore, the strategies of GREED are unlikely to change in the foreseeable future. □

```
010 DIMENSION S(2)
020 RANDOMIZE
030 PRINT "DO YOU NEED INSTRUCTIONS ?"
040 INPUT N$
050 IF LEFT$(N$,1)="N" GOTO 100
```

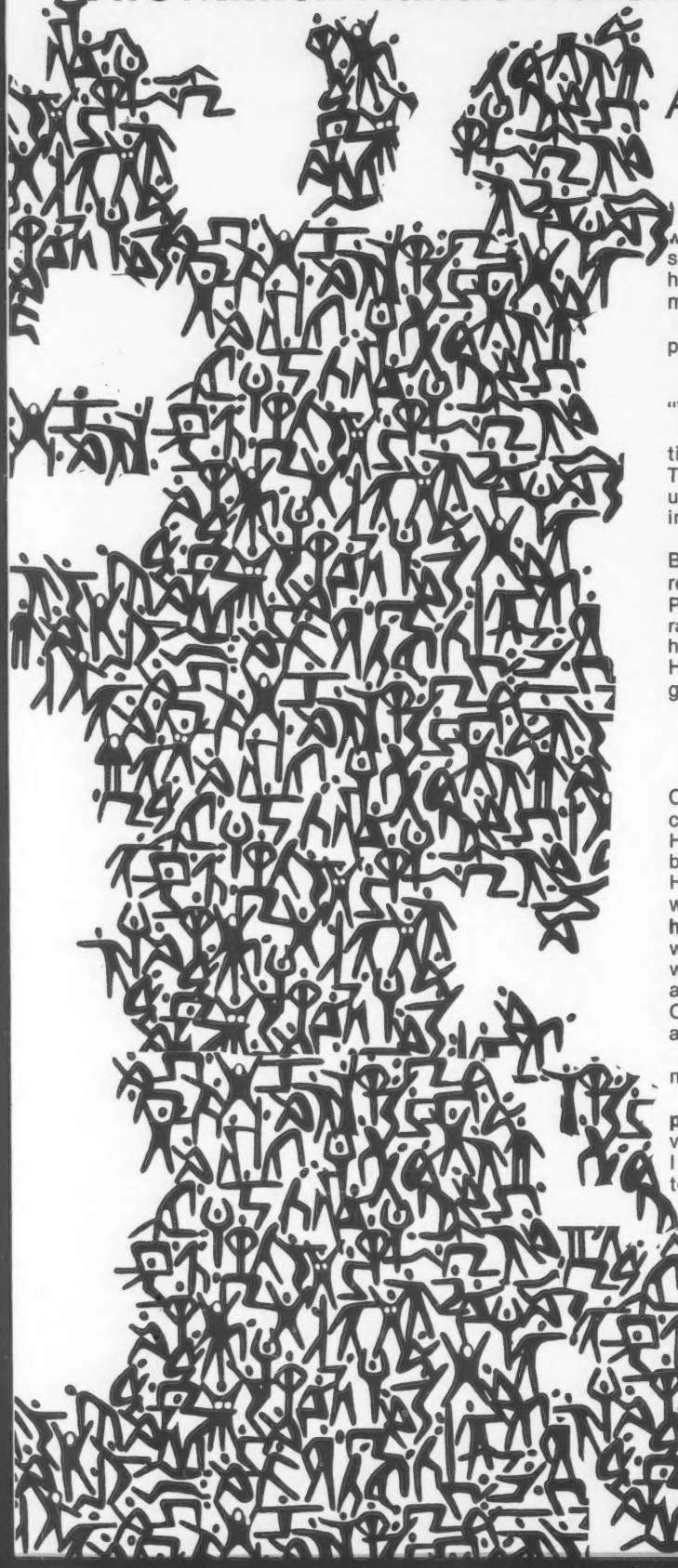
Program lines 60-99 print the instructions given in the second paragraph.

```
100 PRINT "WHAT SKILL LEVEL WOULD YOU LIKE?"
105 INPUT N
122 IF N<100 THEN 124
123 LET N=100
124 LET N=100-N
125 LET I=RND
130 IF I<.5 THEN 140
135 LET N=-N
140 LET S(1)=S(2)=0
141 I=1
145 PRINT "YOUR TURN #" I;
150 GOSUB 400
160 LET T=R1+R9
162 PRINT "FIRST THROW IS " R9;
164 PRINT "ROLL AGAIN?";
166 INPUT N$
168 IF LEFT$(N$,1)="N" GOTO 200
170 GOSUB 400
185 PRINT "ROLL=" R9;
190 IF R1=R9 THEN 195
191 LET T=T+R9
192 PRINT "TOTAL=" T;
193 GOTO 164
195 LET T=0
200 LET S(1)=S(1)+T
202 PRINT
203 PRINT "THIS TURN " T " YOUR TOTAL IS " S(1)
206 PRINT "MY TURN #" I;
210 GOSUB 400
215 PRINT "FIRST THROW IS "R9;
220 LET R1=T=R9
230 LET N1=N1-1
231 IF N1<6 THEN 240
235 LET N1=12-N1
240 LET G=252/N1-R1
241 G=(N*G)/100+G
242 IF (S(2)-S(1))<((10-I)*50) THEN 244
243 LET G=G/2
244 IF (S(1)-S(2))<((10-I)*50) THEN 250
245 IF G<50 THEN 248
246 IF N<60 THEN 249
247 GOTO 250
248 IF N<60 THEN 250
249 LET G=50
250 IF T>=G THEN 285
255 IF I<>10 THEN 257
256 IF S(2)+T>S(1) THEN 290
257 IF T<100 THEN 261
258 IF (T+S(2)-S(1))<100 THEN 261
259 IF 2=R1 THEN 261
260 IF R1<12 THEN 290
261 IF T<250 THEN 265
262 IF (T+S(2)-S(1))>100 THEN 290
265 GOSUB 400
267 PRINT "ROLL=" R9;
270 IF R9=R1 THEN 280
271 LET T=T+R9
273 PRINT "TOTAL=" T
275 GOTO 250
280 LET T=0
281 GOTO 290
285 IF I<>10 THEN 290
286 IF S(2)+T<S(1) THEN 255
290 LET S(2)=S(2)+T
292 PRINT
295 PRINT "THIS TURN " T, "MY TOTAL IS " S(2)
300 LET I=I+1
301 IF I=11 THEN 310
302 GOTO 145
310 IF S(1)<=S(2) THEN 320
315 PRINT "YOU WIN"
316 GOTO 330
320 IF S(1)<S(2) THEN 324
321 PRINT "WE TIED"
322 GOTO 330
324 PRINT "SORRY, YOU LOST"
330 PRINT "PLAY AGAIN?"
332 INPUT N$
334 IF LEFT$(N$,1)="N" GOTO 343
336 GOTO 100
343 STOP
400 LET D3=INT(6*RND)+1
410 LET D2=INT(6*RND)+1
420 LET R9=D3+D2
421 RETURN
999 END
```

Two Million Frantic Frenchmen:

A study in probability

N.B. Winkless, Jr.



Young Stanislaus heard his printer grinding, and went bounding up the stairs to his room. His father was sitting at the machine, happily watching the action. "Ah ha! Caught ya!" said Stan. "I hope you're going to buy me some paper and a new ribbon."

"C'mon, kid," said his Pop." It's only a two-page run, program and all."

"Whatsit?"

The machine ground out a final line and stopped "Take a look," said his father.

And he explained: this is an exercise in probabilities. Suppose you're flipping a coin. Since HEADS and TAILS are equally probably, you'd expect each to come up the same number of times — maybe not immediately, but **after a while**, as you keep on flipping.

In the 17th century, a mathematician named Edmund Borel did a calculation to determine what "after a while" really means. He said that if the two million residents of Paris all started flipping coins, and flipped them at the rate of once per second, and if each stopped only when he had flipped into "equipartition," an equal number of HEADS and TAILS, there would still be a thousand games going after ten years.

"I thought I might check that out," said Pop.

"Hmm," said Stan." Let me see your program.

Pop typed LIST and there it was.

At 91, Pop explained, are the data to start with. Consider: if you flip a coin twice, there are four possible combinations of results, two HEADS, two TAILS, one HEAD and one TAIL, or one TAIL and one HEAD. (If he'd been writing it, he'd have said HH, TT, HT, or TH.) Now, HT and TH represent "equipartition," and the flippers who get those results quit. But HH and TT are misses, **half** of the four possible combinations, and the players who get those continue to flip. So in our data at line 91, we make that **half** a probability factor by letting X equal 1 and Y equal 2, for the X over Y, as you see it at line 100. Clear? Still at 91, P is of course the number of Parisians at play; O is to remember the Original number.

"Pop," said Stan, "I think this is simpler than you make it sound."

"At 92, 95 I print my headings. At 100, I'm counting **pairs** of flips, then reducing P to a new quantity of survivors by multiplying P by the probability factor X/Y; then I figure what percentage those survivors are in relation to the Original number, and I call that N for Net.

N.B. Winkless, Jr., 11745 Landale St., No. Hollywood, CA 91607.

"At 102-108 I'm rounding out the value of P, so that the moire between hexadecimal and decimal doesn't give me fractional Frenchmen.

"Whew!" said Stan.

"And dropping the digits beyond the second decimal place in the N values. Very handy, this formatting in Micropolis Basic."

"Yes, yes," said Stan. "But what are you doing at 120?"

"Giving new values to X and Y, the probability factors. Now, when we do the printout..."

"Hold it," said Stan. "How do you know X is supposed to become Y plus one, and Y become X plus one?"

"Take my word for it," said Pop. "Now, when we do the printout..."

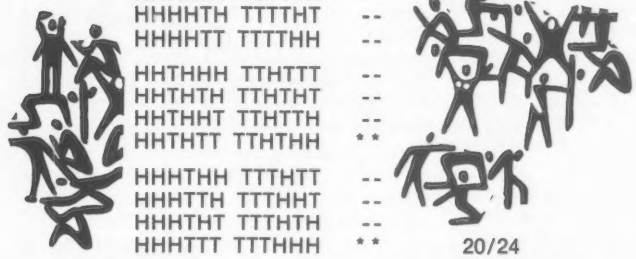
"HOLD IT," said Stan. "I understand everything else you've got there. But how did you light on this X and Y stuff?"

Pop smiled. "Proud of you, son. That is indeed the hard part. I'm sure there must be a standard mathematical routine for it, but —"

"I know, Pop, I know. You were mathematically deprived as a kid. Meanwhile, how'd you do it?"

"I got a pattern by Brute Force." Pop showed his notes:

Pairs Of Flips	Outcomes	Hits	Ratio, Non-Hits To Outcomes
1	HH TT HT TH	**	2/4
2	HHHH TTTT	--	
	HHHT TTTH	--	
	HHTH TTHT	--	
	HHTT TTHH	**	6/8
3	HHHHHH TTTTTT	--	
	HHHHHT TTTTTH	--	
	HHHHTH TTTTHT	--	
	HHHHTT TTTTHH	--	
	HHTHHH TTHTTT	--	
	HHTHTH TTHTHT	--	
	HHTHHT TTHTTH	--	
	HHTHTT TTHTHH	**	
	HHHTHH TTTHTT	--	
	HHHTTH TTTHHT	--	
	HHHTHT TTTHTH	--	
	HHHTTT TTTHHH	**	20/24



"Well?" said Pop, as Stan stood studying. "Do you see the pattern?"

"Wot?"

"Whew!" said Pop. "I was afraid it would be obvious to you. It wasn't to me."

"Wot?" said Stan.

"You see, I've made the X/Y ratio the probability factor. Well, that means that those fractions — the series 2/4, 6/8, 20/24 — are X/Y. Reduce the fractions and what do you get? **You get 1/2, 3/4, 5/6...**"

"Hmm," said Stan. "And it goes on — 7/8, 9/10...?"

"Brute Force says yes. So that's what's happening at 120."

"But why?"

"Beats me. Maybe they'll tell you at school."

Stan looked at the printout. "When does Borel say we'll run out of flipping Frenchmen?"

"He says that after a thousand years, there'll still be ten games going."

"Hmmm. We'd run out of paper before then."

```
1 PRINT CHAR$(6)
5 PRINT: PRINT
9 PRINT CHAR$(16)
10 PRINT "BOREL'S BUSY FRENCHMEN"
20 PRINT: PRINT "TWO MILLION FRENCHMEN"
30 PRINT "START FLIPPING SOUS, ONE FLIP"
40 PRINT "PER SECOND.  WHEN ONE HAS GAINED"
50 PRINT "'EQUIPARTITION' -- WHEN ONE'S HEADS"
60 PRINT "EQUAL ONE'S TAILS — HE QUITS."
70 PRINT "QUESTION: DO THEY DROP AWAY QUICKLY?"
90 PRINT
91 X=1: Y=2: P=2*10^6: O=P
92 PRINT "PAIRS         NUMBER OF       % OF"
95 PRINT "OF FLIPS      SURVIVORS      ORIGINALS"
100 T=T+1: P=P*X/Y: N=P*100/O
102 P=INT(P+.5)
105 P$=FMT(P,"ZZZZZZZV")
108 N$=FMT(N,"ZV.99")
110 IF M=100 THEN PRINT CHAR$(16)
115 IF N<1 THEN 1000
120 X=Y+1:Y=X+1
130 IF T<30 THEN PRINT T;TAB(15);P$;TAB(29);N$
140 IF T>=30 THEN GOSUB 200
150 IF T/30=INT(T/30) THEN M=T/30: PRINT M;TAB(15);P$;
155 IF T/30=INT(T/30) THEN PRINT TAB(29);N$
157 IF M=10 THEN PRINT CHAR$(15)
160 GOTO 100
200 IF J=0 THEN PRINT "MINUTES    SURVIVORS    % OF ORIGINALS":J=1
210 RETURN
1000 PRINT "AFTER ";M;" MINUTES, "
1010 PRINT P$;" FRENCHMEN ARE STILL SHOOTING."
1020 END
READY
```

```
BOREL'S BUSY FRENCHMEN

TWO MILLION FRENCHMEN
START FLIPPING SOUS, ONE FLIP
PER SECOND.  WHEN ONE HAS GAINED
'EQUIPARTITION' -- WHEN ONE'S HEADS
EQUAL ONE'S TAILS — HE QUITS.
QUESTION: DO THEY DROP AWAY QUICKLY?

PAIRS         NUMBER OF       % OF
OF FLIPS      SURVIVORS      ORIGINALS
 1              1000000        50.00
 2               750000        37.50
 3               625000        31.24
 4               546875        27.34
 5               492188        24.60
 6               451172        22.55
 7               418945        20.94
 8               392761        19.63
 9               370941        18.54
 10              352394        17.61
 11              336376        16.81
 12              322360        16.11
 13              309962        15.49
 14              298892        14.94
 15              288929        14.44
 16              279900        13.99
 17              271668        13.58
 18              264122        13.20
 19              257171        12.85
 20              250742        12.53
 21              244772        12.23
 22              239209        11.96
 23              234009        11.70
 24              229134        11.45
 25              224551        11.22
 26              220233        11.01
 27              216155        10.80
 28              212295        10.61
 29              208635        10.43
MINUTES     SURVIVORS     % OF ORIGINALS
 1              205158        10.25
 2              145366         7.26
 3              118772         5.93
 4              102892         5.14
 5               92048         4.60
 6               84041         4.20
 7               77816         3.89
 8               72795         3.63
 9               68637         3.43
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
 102             20399         1.01
 103             20309         1.01
 104             20219         1.01
 105             20129         1.00
 106             20039         1.00
AFTER  106  MINUTES,
  20000 FRENCHMEN ARE STILL SHOOTING.
```

TRS-80 Voice Synthesizer Phonetically Speaking

(L!ISS8N 79ND SSP345LL)

John F. Rogers

The Radio Shack TRS-80 Voice Synthesizer was announced with little fanfare at the beginning of 1979. My order was filled in a relatively short time — the first Radio Shack computer equipment that I didn't await for months! (The March catalog sale mailing features the "NEW" Voice Synthesizer.)

The speech producing unit plugs directly into the keyboard bus or the expansion interface. Turn it on, enter PRINT @ 992,"? H38L8oU ?"; and, it says "Hello" loud and clear!

But what a strange spelling for such a simple word. Why not just enter "HELLO"? As everyone must know, English is not often pronounced as it is spelled. (Remember those spelling tests?) Spoken words are comprised of sound units called phonemes, which are merely suggested by the written letters. (A case can be made for pronouncing GHOTI as "fish"; combine the GH of "rough," the O of "women," and the TI of "initial." Thus, any artificial speech must be composed of such phonemes, and that's why "hello" is spelled H38L80U for the TRS-80 Voice Synthesizer; it must be fed its own special phoneme symbols to form speech that is intelligible.

The operator's manual lists 62 phonemes symbols, but not all of them can be used. The →, :, ", and ↓ are inoperative, and the comma is limited in usage. "FON45T:KL& SP.KE+" (Phonetically speaking), just about any English word (and many foreign words) can be spoken by the Voice Synthesizer if the proper phonemes are entered.

The "window" to the Synthesizer is a 32 print position address map starting at 992 on the video display (the last 32 print positions at the bottom of the screen). Level-I users must enter PRINT AT 992,"? xxxxxxx ?"; to reach the Synthesizer's buffer. The question mark opens the window, a pause is injected with the space bar, the desired phoneme symbols are listed, and another space bar pause precedes the window-closing question mark. The PRINT AT 992 command should be followed immediately by PRINT AT 992," (31 spaces)" to clear the video display.

Level-II can use the PRINT @ command, but the manual offers a POKE subroutine for entering phonemes which is superior because it is clean and fast.

Have you ever had to say, "Beg pardon?" to someone who has said a single word to you? Understanding speech depends heavily upon context; that is, words are understood better when surrounded by other words. The Voice Synthesizer is no exception; in fact, the situation may even be worse. A single spoken word may or may not be clear. Only much practice with the phonemes will give you clearly intelligible speech.

Try entering "K @*&M" (came); it is not very intelligible. Another word difficult to understand is "B35N" (been), and another is "G35T" (get). That is, "stop plosives," initial consonants such as B, D, G, P, T, K, are not easy to hear out of context. But enter "PL@*& @@ G@*&M" (play a game) and the plosives are easily understood. Hence, the programmer must test carefully for clarity any words which are to be sounded singly before using them.

The manual gives suggestions and lists a few phonetic spellings, but the user has to keep trying various combinations of phonemes until pronunciation is clear and understandable.

The appended list of phoneme spellings of several common words may be helpful in guiding a user to the correct phonemes for a particular sound. Even if the word you want is not listed, some homonymic (same sound) relationship to the listings should be useful in finding the desired phoneme combination. (The writer would be interested to hear if anyone detects a Southern accent in his list.)

The very first program that I wrote for the TRS-80 Voice Synthesizer was a spelling practice routine for a third grader having reading and spelling

John F. Rogers, 600 Seventh St., Morgan City, LA 70380.

problems. Writing such a program was an excellent way to learn the phonemes required for clarity with single words and also led to especially clear phrases.

The title of the program, "Listen and Spell," is entered phonetically as "L!ISS8N 79ND SP35L," which explains the strange subtitle of this article. My name could be entered as "DJAONN R;ADJ/Z."

Programs have been written which utilize the cassette recorder to store spoken words for playback in spelling tests (for example, David B. Moody's "Spelling Bee" in *Kilobaud*, December 1978), but placing the phonetic spellings in a DATA statement is much easier.

The major shortcoming of the TRS-80 Voice Synthesizer is the limited buffer: only 30 phonemes at a time (which includes spaces) can be input. Software delays (FOR-NEXT loops, graphics displays, etc.) must be placed between phrases or a buffer overflow will create garbled speech from the Synthesizer. (One can use the formula I = 40*P to determine the FOR-NEXT count: P is the number of phonemes to be entered and I is the loop index.)

If a TRS-80 owner wishes to have his computer talk to him, the Voice Synthesizer is a good buy at $399. In most respects, it is an excellent addition to the Radio Shack microcomputer. Its uses will be limited only by the user's imagination. (Where have I heard that statement before?) And It's fun!

Program Description

In the program "Listen and Spell," the user hears a word spoken twice, and is asked to spell it on the keyboard and hit ENTER. He has two chances to get the correct spelling before the program supplies it. There are both visual and spoken prompts. Of course, the words in DATA statements can be adjusted to the student's level and needs.

REMarks for simple program adaptable to Level-I

Lines 10 through 130 prepare the user for the upcoming spoken words he is to spell. There are both written and oral instructions.

Lines 300 through 1200 produce the spelling words with spoken and written responses to the speller's entries. (The subroutine in line 1200 clears the window immediately after a PRINT @ 992, to keep the display uncluttered.)

The routine in lines 5000 through 5040 can test the phoneme spelling of a word for correct and clear pronunciation by the Voice Synthesizer before listing it in a DATA statement.

REMarks for more elaborate Level-II program

Lines 10 through 215 set up the routine to be followed by the speller with both written and oral instructions. Subroutine 500 through 520 is a graphics dressup for spelling entries.

Subroutines 750 through 760 and 800 through 810 contain response speech to spelling entries.

Lines 230 through 320 cause words to be spoken and appropriate responses to be made to the speller's entries.

Subroutine 1000 through 1050 is the POKE routine that "prints" the phonemes in the window to the Voice Synthesizer rapidly, one at a time, and keeps the video display clear.

Lines 5000 through 5030 contain a pre-tesing routine to check phonetic spellings for clarity and correctness prior to their entry in a DATA statement.

AJA Software is first . . . in price; in performance; in reliability!

All AJA "Ready-to-Run" software packages are written in BASIC, are available on diskette only, and come complete with easy-to-follow instructions. For complete list of available software, send for FREE catalog.

WIDE SELECTION OF TRS-80 SOFTWARE
The following programs are written for the TRS-80 and require: 16K memory, Level II disc BASIC; 16K memory interface; 1 or 2 disc drives; Radio Shack DOS. Printer is optional.

Program Utility Package	$ 35
Radio Shack Disk BASIC Tutorial	$ 35
Letter Writer	$ 35
Payroll	$ 35
General Ledger	$ 35
Inventory	$ 35
Accounts Payable	$ 35
Accounts Receivable	$ 35
Sales/Sales Analysis	$ 35
TRS-80 INTEGRATED BUSINESS PACKAGE	$175

Includes accounts payable, accounts receivable, payroll, general ledger, letter generator, business statistics, inventory, and sales/sales analysis. Requires two disc drives.

California residents add 6% sales tax

NEW! FIRST TIME LISTED

Record/Book Library	$ 15
NORTH STAR	
Chess in Basic	$ 35

Beat the computer, if you can. Requires 2 disc drives

Property Management	$125

Just what you need to keep track of investments.

PROVEN WINNERS

Homemaker I	$ 50

Appointment minder, shopping list, menu planner, diet planner. Specify: TRS-80; NORTH STAR; APPLE II.

Word Processor	$ 35

Comes complete with easy to follow instructions

(714) 774-1270

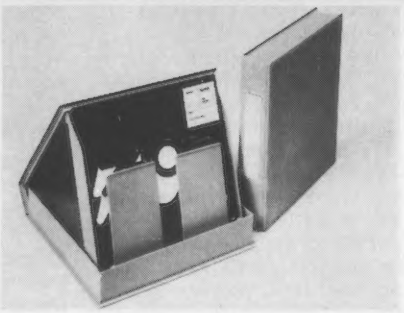
AJA **AJA SOFTWARE**
P.O. Box 2528 • Orange, CA 92669

CIRCLE 118 ON READER SERVICE CARD

Voice, con't....

```
1 REM        TRS-80 VOICE SYNTHESIZER
2 REM            UTILIZATION
3 REM              PROGRAM
4 REM                BY
5 REM           JOHN F. ROGERS
6 REM           600 SEVENTH ST.
7 REM           MORGAN CITY,
8 REM           LOUISIANA 70380
9 REM
10 CLS
20 FOR X=0 TO 44:SET(0,X):SET(127,X):NEXT X
30 FOR Y=1 TO 126:SET(Y,1):SET(Y,43):NEXT Y
40 PRINT@150,"H  E  L  L  O !";:VO$=" H38L8EU ":GOSUB 1000
45 FOR K=1 TO 600:NEXT K
50 PRINT@275,"THIS IS A SPELLING GAME ";
60 VO$=" <!IS !IZZ @) SP35L!+ G@)*MM ":GOSUB 1000
65 FOR K=1 TO 1000:NEXT K
70 FOR X=0 TO 44:RESET(0,X):RESET(127,X):NEXT X
75 FOR Y=1 TO 126:RESET(Y,1):RESET(Y,43):NEXT Y:CLS
80 FOR X=1 TO 126:SET(X,1):SET(X,43):NEXT X
85 FOR Y=0 TO 44:SET(0,Y):SET(127,Y):NEXT Y
90 PRINT@85,"HERE'S HOW TO PLAY :";
100 VO$=" HE/Z H;U T(UP8L@)& ":GOSUB 1000
110 FOR K=1 TO 1500:NEXT K
115 PRINT@204,"I WILL SAY A WORD,";
120 VO$=" ;5#& W!LLS@*& @*W/RD ":GOSUB 1000
125 FOR K=1 TO 1180:NEXT K
130 PRINT@356,"AND YOU WILL SPELL IT";
140 VO$=" 99ND Y(UU W!LLSP35L'IT ":GOSUB 1000
145 FOR K=1 TO 960:NEXT K
150 PRINT@455,"BY ENTERING THE LETTERS";
155 VO$=" B;5#&3NT/!+ <77L35T/Z ":GOSUB 1000
157 FOR K=1 TO 960:NEXT K
159 PRINT@547,"ON THE KEYBOARD.";
161 VO$=" ;ANNC77KE&BOCRD ":GOSUB 1000
165 FOR K=1 TO 1800:NEXT K:CLS
170 FOR X=1 TO 63 STEP 2:PRINT TAB(X)"*";:NEXT X
175 FOR Y=2 TO 62 STEP 2:PRINT TAB(Y)"*";:NEXT Y
180 PRINT@217,"R E A D Y ?";
190 VO$=" R355DE& ":GOSUB 1000
195 FOR K=1 TO 800:NEXT K
200  PRINT@342,"LISTEN CAREFULLY :";
210 VO$=" L!ISS8N K)@3RF%LLE& ":GOSUB 1000
215 FOR K=1 TO 1000:NEXT K:CLS
220 GOTO 250
230 CLS:GOSUB 500:PRINT@213,"THE NEXT WORD IS...";
240 VO$=" <EEN345K050TW/RD !IZZ ":GOSUB 1000
245 FOR K=1 TO 1080:NEXT K
250 READ S$,VO$:CLS:GOSUB 500
260 FOR X=1 TO 2:GOSUB 1000:FOR Y=1 TO 900:NEXT Y:NEXT X
270 CLS:GOSUB 500
280 PRINT@144,"YOUR SPELLING....";:INPUT A$
290 IF A$=S$ GOSUB 750:GOTO 230
300  GOSUB 800:PRINT@284,"TRY AGAIN...";:INPUT A$
310 IF A$=S$ GOSUB 750:GOTO 230
320 PRINT@400,"THE CORRECT SPELLING IS ' ";S$;"  '";:FOR N=1 TO 2000:NEXT N:GOTO 230
399 STOP
400 DATA AND,99ND,ARE,;RR,CAN,K79NN,COME,K67MM,FUNNY,F67NE&,GO,GOC,HE,HE&,IS,!IZZ,JUMP,J67MP,LIKE,L6AEK,LITTLE,L!IT8L,LOOK,L$%K,MY,M
;!E,OF,67VV,PLAY,P8L@*&,RED,R345DD,RUN,R67N,SAID,S345DD,SEE,SS.E,THE,<.E,THIS,<!ISS,TO,T(U,UP,67PP,YOU,Y'U
410 DATA AT,79TT,AWAY,7W@*&,BIG,B!IGG,BLUE,BL'U,DOWN,D;UNN,FOR,F12R,GOOD,G$%DD,GREEN,GR.ENN,HAVE,H97VV,HERE,HE/,IN,!INN,ME,M.E,IT,!I
T,NOT,N;7TT,ON,;ANN,ONE,W67NN,RAN,R99N,SAW,SS12,THREE,=R.E,TOO,T'(U,WE,W.E,WILL,W!ILL,YELLOW,Y35LLOC
420 DATA YES,Y35SS,
500 FOR X=1 TO 63 STEP 2:PRINT TAB(X)"W";:NEXT X
510 PRINT@640," ":FOR Y=1 TO 63 STEP 2:PRINT TAB(Y)"W";:NEXT Y
520 RETURN
750 VO$=" KOCR35K0T ":PRINT@535,"C O R R E C T !";:GOSUB 1000
755 FOR N=1 TO 1500:NEXT N
760 RETURN
800 VO$=" WROOC+   TR;5# 7G'IN ":GOSUB 1000
810 RETURN
1000 POKE  16383,63:POKE 16383,32
1010 FOR VX=1 TO LEN(VO$)
1020 POKE 16383,ASC(MID$(VO$,VX,1))
1030 NEXT VX
1040 POKE 16383,32:POKE 16383,63:POKE 16383,32
1050 RETURN
5000 CLS
5010 PRINT@0,"ENTER PHONEMES...";
5020 INPUT VO$:GOSUB 1000
5030 GOTO 5000
```


FREE FLOPPY STORAGE



The KAS-ETTE/10 library case provides an ideal storage unit for standard and mini floppies.
FREE KAS-ETTE/10 with purchase of Scotch Brand™ Diskettes.

Standard 8" Scotch Brand™ Diskette

Stock no.		Price/Box
740-0K	IBM Compatible	$45.00
740-32K	Shugart - 32 Sector	48.00

Mini 5¼" Scotch Brand™ Diskette

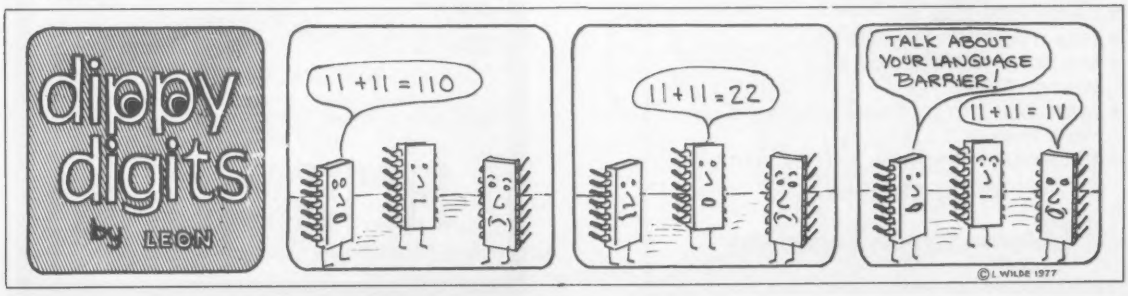
Stock No.		Price/box
744-0K	Soft Sector	44.00
744-10K	10 Sector	44.00
744-16K	16 Sector	44.00

Take advantage of this limited offer – NOW!

Alpha Supply Company
9625 Mason Ave., Chatsworth, Ca. 91311 / (213) 882-9818

CIRCLE 114 ON READER SERVICE CARD

```
1 REM        TRS-80 VOICE SYNTHESIZER
2 REM           UTILIZATION
3 REM       "LISTEN AND SPELL" PROGRAM
4 REM                 BY
5 REM           JOHN F. ROGERS
6 REM           600 SEVENTH STREET
7 REM           MORGAN CITY,LA 70380
8 REM
10 CLS
20 PRINT@70,"THIS IS A SPELLING GAME."
30 PRINT@992,"? <I!S !IZZ @ SP3SL!+ G)*MM ?";:GOSUB1200:FOR N=1 TO 1500:NEXT N:CLS
40 PRINT@150,"I WILL SAY A WORD,"
50 PRINT@992,"? ;5#& W!L S@*& @ W/RD ?";:GOSUB1200:FOR N=1 TO 1200:NEXT N
60 PRINT@192,"AND YOU WILL SPELL IT"
70 PRINT@992,"? 99ND Y(UU W!L SP3SL IT ?";:GOSUB1200:FOR N=1 TO 1200:NEXT N
80 PRINT @ 270,"BY ENTERING THE LETTERS"
90 PRINT@992,"? B;5#& 3NT/!+ <77 L3ST/Z ?";:GOSUB1200:FOR N=1 TO 1200:NEXT N
100 PRINT@360,"ON THE KEYBOARD."
110 PRINT@992,"? ;ANN <77 KE&BOERD ?";:GOSUB1200:FOR N=1 TO 2000:NEXT N:CLS
120 PRINT@470,"R E A D Y ?":PRINT@992,"? R3SD& ?";:GOSUB1200:FOR N=1 TO 600:NEXT N
130 PRINT@540,"LISTEN CAREFULLY....";:PRINT@992,"? L!ISS8N K)@3RF%%LLE& ?";:GOSUB1200:FOR N=1 TO 1500:NEXT N:CLS
200 GOTO 310
300 CLS:PRINT@74,"THE NEXT WORD IS....":PRINT@992,"? <E N345K0S0T W/RD !IZZ ?";:GOSUB1200:FORN=1TO1200:NEXTN
310 READ S$,W$:CLS
320 FOR X=1 TO 2:PRINT@992,"? "; W$;  " ?";:GOSUB1200:FOR Y=1 TO 1200:NEXT Y: NEXT X
330 CLS:PRINT@144,"YOUR SPELLING....";:INPUT A$
340 IF A$=S$ GOSUB 1000: GOTO 300
350 GOSUB1100:PRINT@284,"T R Y  A G A I N ...":INPUT A$
360 IF A$=S$ GOSUB 1000: GOTO 300
370 CLS:PRINT@340,"THE CORRECT SPELLING IS ' "; S$;" '";:FOR N=1 TO 2000:NEXT N:GOTO 300
999 STOP
1000 PRINT@992,"? KOERR35K0T ?";:GOSUB1200:PRINT@660,"C O R R E C T !";:FOR N=1 TO 1200:NEXT N:CLS:RETURN
1100 PRINT@992,"? WROOE+    TR;5# 7GI!N ?";:GOSUB1200:RETURN
1200 PRINT@992,"                                        ";:RETURN
2000 DATA STOP,SS0T;APP,HEAVY,H345VV&&,WENT,W35NNTT,WORD,W/RRD0D,THIS,<!1SS,ZERO,ZZ*#R8EU,ADD,999S08D,ENTER,33NN0T/R,SAVE,SS@**&V0V
,FINE,FF;5#&&N0N,FIN,FF11N0N
2010 DATA WITH,WI!=,SPEAK,SP.K,THAT,<99T,ARE,;;R,BEEN,B34N,MADE,M@*&DD,ONE,W67N,DIVIDE,D!VVA;#&DD,FULL,FF6%LL,END,3SNDD,HOW,H;AU,YOU
,Y(UU,NO,N8OU,THREE,==RR.&,FOUR,FOOR,FROM,FR86MM,YES,Y43SS,READY,R3SD&,FIVE,FA;#&VV
2020 DATA SAID,S345DD,DAY,D@*&,MOP,M;,PP,SIX,SI#K0S,MEET,M.ETT,EVEN,.EVV8N,BEG,B345GG,BIRD,B//RD0D,PIN,PIIN0N,IT,!ITT,MUSIC,M((Z!K,F
OR,FOERR,BOOK,B'%K,MOVE,M''VV,PUT,P%%TT,SCHOOL,SK%UL,OVER,OV//,ABOUT,7B;)5T,FINAL,F;5#&N8L
2030 DATA ANY,35NE&,BAG,B99GG,PAID,P@*&DD,FAST,FF99STT,GET,G35TT,JOB,J;ABB,KILL,K!ILL,LAND,LL99NDD,HIM,HH!IMM,MAT,M79TT,WILL,W!ILL,A
ND,99NDD,THE,<=.E,LETTER,L3STT/,CAT,K79TT,CORRECT,KOER35K0T,IS,!IZZ,AT,79TT,ON,;ANN,NOTE,N00TT,USE,UUZZ
2040 DATA HEARD,HH//DD,OFF,12FF,WHEN,WH35NN,LEARN,LL//NN,HAT,HH99TT,SEVEN,S54V4NN,NOT,N;ATT,IN,!INN,THESE,==.EZZ,EIGHT,))*&T,TABLE,T
)*&B8L,LONG,LL;AN+,NINE,N;4&NN,TEN,T3SNN,PHONE,FFOONN,TRICK,TR!IKK,SUN,SS66NN,RED,RR3450D,FLAP,FFL99PP
2050 DATA THINK,==!I+0K,PAST,P7950ST,HAPPY,HH79PPE&,PAIR,P@*R,SOAP,SS00PP,FISH,FF!I)),MOTHER,M66(/,HAVE,HH99VV,SHOP,)),APP,YARD,Y);R
DD,ZIPPER,ZZ!IPP/,PATH,P79==,THING,=!E++,ASK,7950N,PASS,P79SS,CITY,SS!IT&&,HAZE,HH@*&ZZ,VAN,VV79NN
5000 CLS
5010 PRINT@0,"ENTER PHONEMES..."
5020 INPUT B$
5030 PRINT@992,"? ";B$," ?";
5040 GOTO5000
```



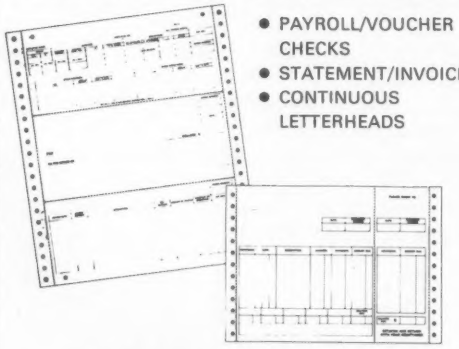
Voice, con't....

TRS-80 VOICE SYNTHESIZER

PHONETIC SPELLINGS

ENGLISH WORD	PHONEMES
A	
A	@@&
A (SHORT)	66
ABOUT	6B;'T
ACTION	99K >> 8N
AGAIN	6GIIN
ALSO	1LSOW
ALWAYS	1LW@*&Z
AM	99MM
AND	99ND
ANY	35N&
ARE	;AR
ARITHMETIC	6RI = M4TIK
ASK	99SK
ASKED	99SKT
AT	99T
AWAY	6W@*&
AZURE	97XXU/
B	
B	B.E
BEEN	B35N
BEG	B35GG
BIG	BIIGG
BIRD	B/RD
BLUE	BLL('
BOOK	B'(K
BUT	B76T
BUTTER	B67Q/
BY	B;5#&
C	
C	S.E.
CALL	K12ϟI
CAN	K99N
CAREFULLY	K)@SRF%LL&
CHAP	TC99P
CITY	SIT&
COME	K67MM
COMPUTEF	KAMPY(T/
CORRECT	KOR45KT
CUFF	K67FF
D	
D	D.E.
DAY	D@*&
DEEP	D.EPP
DIVIDE	DIV;#*D
DO	D((UW
DOES	D66ZZ
DOUGH	DOOW
DOWN	D;UNN
E	
E	.E
EITHER	.E << /
END	35ND
ENDED	35ND5D
ENTER	35NT/
EVEN	.V3N
F	
F	35FF
FAST	F99ST
FIN	FIIN
FINAL	F;#&N8L
FINE	F;5#&N
FOR	FOϟ2R
FROM	FR86MM
FULL	F%%L
FUNNY	F67N&
G	
G	DJ.E
GAME	G@)**M
GET	G35T
GO	GOϟW
GOOD	G'%D
GREEN	GR.EN
H	
H	@&TC
HAPPY	H99P&
HAS	H99Z
HAVE	H97VV
HAZE	H@*&ZZ
HE	H.&
HEAVY	H35V&
HELLO	H38L8OU
HERE	H./
HIM	HIIMM
HONEST	A;N4ST
HOOF	Hϟ$F
HOW	H;;U
I	
I	;5#&
IDEAL	;#&D.8L
IN	IIN
INSTRUCTOR	INSTR67KT/
IS	IIZZ
IT	IIT
J	
J	DJ@@&
JACKET	DJ97K5T
JOB	DJ;AB
JUDGE	DJ67DJ
JUMP	DJ67MP
K	
K	K@@&
KEYBOARD	KE&BOϟRD
KICK	KIIK
KILL	KIILL
KIND	K;#&ND
KNOB	N;AB
L	
L	35LL
LAND	L99ND
LATCH	L99TC
LAW	L218
LETTERS	L35Q/RZ
LIKE	L6A&K
LIST	LIIST
LISTEN	LIIS8N
LITTLE	LIIQ8L
LONG	LOO+
LOOK	L'%K
M	
M	35MM
MADE	M@*&D
MARCH	M;RTC
MAT	M99T
MEASURE	M45XX/R
MEET	M.T
MISTER	MIST/
MOP	M;P
MOTHER	M77 << /

CONTINUOUS BUSINESS FORMS



- PAYROLL/VOUCHER CHECKS
- STATEMENT/INVOICES
- CONTINUOUS LETTERHEADS

- CUSTOM IMPRINTED FOR YOUR COMPANY
- ORDER AS FEW AS 250
- LESS THAN CUSTOM PRICES
- SPACED TO FIT STANDARD #10 WINDOW ENVELOPES
- ALSO-COMPLETE SELECTION OF RIBBONS FOR YOUR PRINTER.
- FOR MORE INFORMATION, CALL OR WRITE:

(213) 882-9818

Alpha Supply Company

9625 MASON AVE., CHATSWORTH, CALIF. 91311

CIRCLE 115 ON READER SERVICE CARD

TRS-80

CENTRONICS MODEL 779 LINE PRINTER W/TRACTOR DRIVE AND CONNECTING CABLE	**$1275**
CENTRONICS MODEL 700 LINE PRINTER W/WIDE CARRIAGE, TRACTOR DRIVE, 2 CHANNEL VFU, PAPER EMPTY LIGHT, AUDIBLE BELL, LINE FEED AND FORM FEED SWITCH, MOTOR ON/OFF CONTROL AND CONNECTING CABLE	**$1550**
SHUGART•PERTEC•MPI DISK DRIVES W/2 DRIVE CONNECTOR CABLE, POWER SUPPLY AND CABINET (DRIVE 0 EQUIV.)	**$399**
SHUGART•PERTEC•MPI DISK DRIVES W/POWER SUPPLY AND CABINET (DRIVE 1, 2, 3 EQUIV.)	**$375**
16K OF 200ns NEC MEMORY FOR TRS-80 KEYBOARD	**$95**
16K OF 200ns NEC MEMORY FOR TRS-80 EXPANSION INTERFACE	**$93**

ALL ITEMS CARRY A 30 DAY WARRANTY
MASTERCHARGE•VISA•BANKAMERICARD ACCEPTED
FOR FAST SERVICE OR MORE INFORMATION, CALL
(714) 893-2311

AMS *ADVANCED MICROCOMPUTER SYSTEMS*

13771 UNIVERSITY • WESTMINSTER, CA • 92683

CIRCLE 106 ON READER SERVICE CARD

MOVE	M'UVV
MUSIC	MY(ZIK
MY	M;!E
N	
N	35NN
NEAR	N./
NEGATION	NEG@&>8N
NETWORK	N45TW/K
NEW	NY'W
NEXT	N35KST
NO	NO↑W
NOT	N;7T
NOXIOUS	N;K>!6S
NUMBER	N67MB/
O	
O	OOW
OBJECT	;BDJ45KT
OBLIGE	OBL;#&DJ
OF	67VV
OFF	12FF
OFFICIAL	OFI!>8L
OFTEN	1FF8N
ON	;ANN
ONE	W67NN
OPERATE	1P/R@*&T
ORDER	↑1D/
OUT	;'T
OVER	O↑V/
P	
P	P.E
PAID	P@*&D
PASS	P99SS
PATH	P99==
PAUSE	P16ZZ
PHONE	FO↑NN
PHONEMES	FO↑N.MZ
PIN	PIN
PLAY	PL@)&
PLEASE	PL.EZ
PUT	PU(T
Q	
Q	KY'U
QUALITY	KW1LIT&
QUESTION	KW35TC88N
QUIET	KW;#&5T
QUIZ	KWIIZZ
R	
R	;AR
RADICAL	R99DIK8L
RANGE	R@*&NDJ
RATIO	R@*>>IOW
READ	R.ED
READY	R35D&
RECORD	R45K↑/D
RED	R35DD
ROBOT	RO↑B12T
RUN	R67NN
S	
S	35SS
SAID	S345D
SAVE	S@*&VV
SAW	S128
SAY	S@@&
SCHOOL	SK"L
SEE	S.&
SHALLOW	>>99LOW
SHORT	>>O↑RT
SINGLE	SIEN+8L
SMOOTH	SM'U<<
SPEAK	SP.K
SPELLING	SP35L.+
STOP	ST;P
SUN	S67NN
SYMBOL	SIMB8L
T	
T	T.E.
THAT	<99T
THE	<.E
THE	<67
THESE	<<.EZZ
THING	=!E+
THIS	<!IS
THREE	==RR.&
TO	T((U
TRY	TR;5#&
TURN	T/RN
U	
U	Y'U
UGLY	67GL&
UNITY	Y'NIT&
UP	67P
URGE	/RDDJ
USE	Y'UZZ
USELESS	Y'SSL4S
USUAL	Y'ZXYUW8L
V	
V	V.E
VACANT	V@*K8NT
VALUE	V9ALY'
VAN	V99N
VARIABLE	V@*7R&AB8L
VARY	V@7R&
VERY	V35R&
W	
W	D67B8LY'
WALK	W↑1K
WE	W.&
WELCOME	W35LK↑M
WENT	W35NT
WHERE	W@@/
WILL	WIILL
WITH	WI!==
WORD	W/RD
WRONG	WROO+
X	
X	35KS
XEROX	A.R67KS
X-RAY	35KSR@*&
Y	
Y	W;5#&
YARD	Y);RD
YELLOW	Y45LOW
YES	Y35SS
YOU	Y'U
YOUR	YO↑/
Z	
Z	Z.E
ZEBRA	Z.BR7
ZERO	Z.RO↑W
ZIPPER	ZI!P/

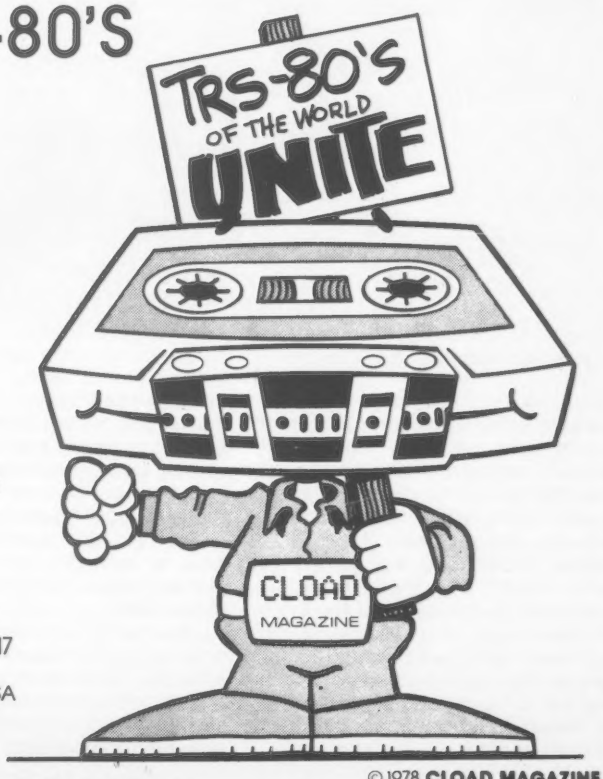
ATTENTION TRS-80'S

Why sit in the corner in the dark and turned off while your master is sitting by the light, turned on to Creative Computing Magazine? You need a magazine of your own for Education-Enlightenment-Enjoyment and for the personal satisfaction (you're a personal computer, aren't you?) of your very own possession. . . A Subscription to **CLOAD MAGAZINE!** Turkey your master into sending a $36.00 check to the jive cats at **CLOAD MAGAZINE.** You will get 12 C-30 cassettes, one a month, each one filled with all kinds of juicy software—Games, Tutorials, Practical Programs and Impractical Trivia. All programs rated G for computers under 18 years old.

Do It! Subscribe Now!

CLOAD MAGAZINE

Box 1267
Goleta, CA 93017
(805) 964-2761
MasterCharge/VISA welcome



CIRCLE 127 ON READER SERVICE CARD

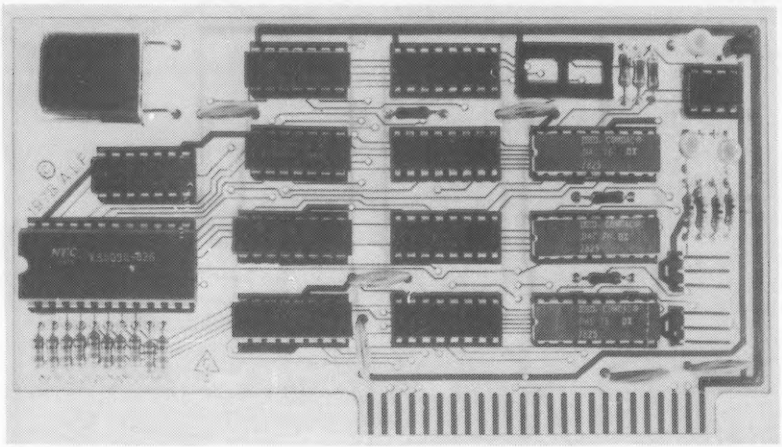
© 1978 **CLOAD MAGAZINE**

ALF/Apple Music Synthesizer

Steve North

If you have an Apple computer, then you've probably played with programs or subroutines that make primitive music-like sounds through the Apple's built-in speaker. The ALF Apple Computer Music Synthesizer enables you to perform and experiment with high-quality computer music and is also the first significant personal computer music product to surface in at least a year.

The synthesizer card plugs into one of the Apple peripheral slots and connects to any reasonably good audio amplifier. The board has three channels or voices, each capable of playing a single note, with direct hardware control of pitch and volume. One channel is restricted to playing square waves, while the other two may be programmed for either "normal mode" (square waves) or "pulse mode" in which the Apple controls the pulse width of the pitch generator. More complex effects can be created with the appropriate software, and more synthesizer cards can be added for more than three voices or for stereo. Our test unit had two synthesizer cards.



ALF Music Synthesizer

Given this hardware, to play music you need software to help you enter music, correct your mistakes, play the song, and then save or reload the composition for future use. ALF provides a program called ENTRY with the synthesizer card for this purpose. ENTRY is unlike any other music package we've seen for personal computers as it is graphics oriented. In the past, most computer music systems were designed for any kind of terminal or graphics device, thus, interaction was restricted to alphanumeric input/output. To enter sheet music, you had to convert the notes to a series of letters and numbers representing note value, duration, etc. This is merely a nuisance when entering the music, but a hassle when trying to debug the composition since you have to mentally convert from the alphanumeric notation back into sheet music.

By being completely graphics oriented, ENTRY avoids many of the pitfalls of other music systems. In the high-resolution graphics mode, a staff and a list of menu items are drawn on the screen. The two game paddles are used to enter music information, while commands to the music system are typed on the keyboard.

One of the game paddles moves a "note cursor" up and down the staff. By turning the game paddle to the appropriate position, you can select a note from a range of about five octaves. Pressing the button on the paddle inputs the note and the cursor moves to the next position. The other paddle allows you to select items on the menu which appears below the staff. The items, from left to right are:

REST	Creates a rest at the current position of the note cursor of the current note duration.
	Sets the current note duration. The video-inverse block indicates the current value.
.	Dotted note.
3	Triplet.
♯ ♭ ♮	Accidental.
→	Moves note cursor right (for editing)
←	Moves note cursor left (also for editing).
INS	Selects insert mode of editing.
DEL	Deletes note under the note cursor.
TIE	Enters a tied note.
▷	Controls playing of notes during editing.

To select a menu item, the user moves the cursor (an arrow) to the appropriate item and then presses the

game button. Thus entry of music is done by turning the game paddles and pressing the buttons. According to ALF, the game paddle inputs are faster than typing in alphanumeric code, once you've had practice. We also thought they were easier to understand and more fun.

The non-menu commands (entered from the keyboard) include:

NEW	Clears the workspace for a new composition.
EDIT	Changes parameters such as number of parts, speed, etc.
STEREO	Selects stereo positioning for 2 or 3 boards.
SPEED	Changes time duration of all notes.
SAVE	Saves song on cassette tape.
LOAD	Loads a song from cassette tape.
PLAY	Causes the song to be played.
DELETE	Deletes a number of items from the current cursor position forward.
LENGTH	Allows entry of notes and rests of non-standard length.
SUBROUTINE	Creates or edits a music subroutine.
PART	Moves cursor to the first item in a specified part.
MEASURE	Moves cursor to the specified measure in the current part.
QUARTER	Sets time duration of a quarter note.
KEY	Sets key signature.
TIME	Sets time signature.
TEMPO	Sets dynamic tempo during playback for systems with hardware tempo control.
POKE	Inserts non-standard item.
TRANSPOSE	Sets a transpose value for playback.

Envelope values for attack, decay, gap, release, sustain, and volume can also be input from the keyboard at the beginning of a composition and anytime later when you want to change the envelope parameters. The music system can play up to eight voices, but the voices are input one at a time, and unfortunately cannot be seen together on the same screen. However, displaying all the notes at once might actually be more difficult for the user. For instance, if two voices played the same note, it would be difficult to tell one from the other since the notes would overlap on the display.

Although it may not be apparent from this short description, ENTRY, written by John Ridges, is a very well thought out, human engineered package. For instance, the current measure number and free workspace are constantly displayed on the screen. If you enter a note duration which is too long for the current measure, the program automatically creates a tied note. When the user inputs the key signature (as in KEY:2S for two sharps) the computer displays the key signature on the staff. As you enter notes on the screen, or perform editing functions, they are also played through the synthesizer. Or, if you have two C-sharps in the same measure, standard music notation requires putting the # sign only before the first. If you delete the first one, the # sign automatically moves over to the second. Obviously, someone put a lot of thought and effort into this program, and it shows.

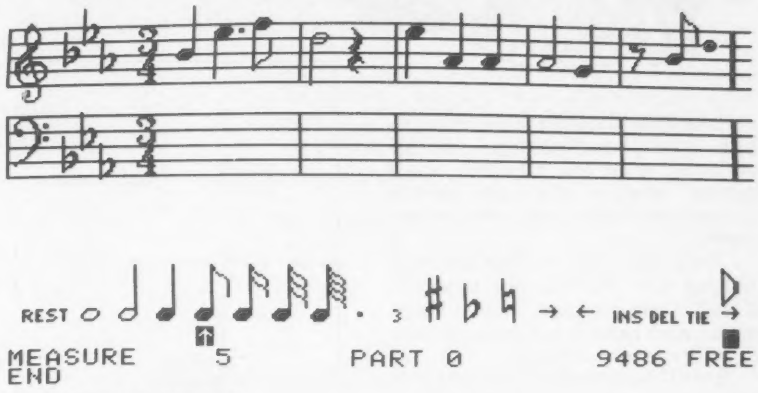


Photo of screen in entry mode

During playback, the high-resolution display of the screen is erased and a simple animated low-resolution color display of all the voices shows what's being played. The playback speed can be dynamically changed with one of the game paddles.

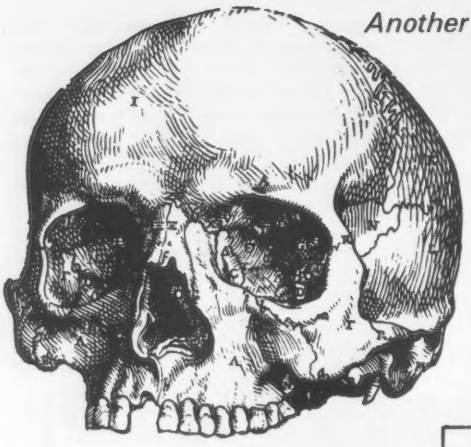
Besides ENTRY, ALF also supplies a shorter playback-only program (which uses less memory), a music-playing subroutine which can be incorporated into your own programs, and some sample music. The version we tried was cassette-based, but a disk version of the software is also available.

Despite the fact that Apple is probably the second best-selling personal computer, there's a noticable scarcity of plug-in options made by second sources. The ALF Music Synthesizer is the only significant one that comes to mind, other than a small assortment of serial interfaces and kluge cards. According to Philip Tubb, one of the project engineers and software designers of the synthesizer, "Don't be surprised that more people aren't making Apple peripherals. It's much, much harder than we expected. Apple's hardware and software is very poorly designed in terms of usability and expansion. Their boards are too small to fit anything on, and if you can fit it on anyway, there isn't enough power or heat dissipation. We were having quite a few problems until we switched our design over to a "mystery chip" which we're not saying anything more about at this point."

In the past year or so, computer music has more or less reached a plateau, although Philip said that "we really hope to stir things up with this Apple product, and have a few more surprises coming up (with any luck)." Probably the problem is that the companies into computer music a while ago directed their efforts at S-100 bus systems. Once sales of those systems declined, their markets dried up and so they were reluctant to develop new products. (Solid State Music has even decided to drop its old name.) Newer computers like the TRS-80, Apple, and PET are not designed for much expansion, and owners of these less expensive machines are unwilling to pay many hundreds of dollars for computer music systems. Of course, homebrewers continue to pioneer the field, but these people account for only a fractional percentage of the whole user community and thus, until their designs become actual products, have no relation to the average software-oriented computer user. It's encouraging that ALF has taken a step forward.

The ALF Apple Music Synthesizer retails for $265.00 and is available from Apple dealers or from ALF Products, Inc., 128 S. Taft, Denver, CO 80228, (303) 234-0871. The price includes the circuit card, cable, cassette, and shipping. □

Another new game from Creative Computing ....



Inspector Clew-So

Ronald J. Carlson

Inspector Clew-So is a computerized detective simulation loosely patterned after the detective board games. However there are several unique and challenging twists in this game.

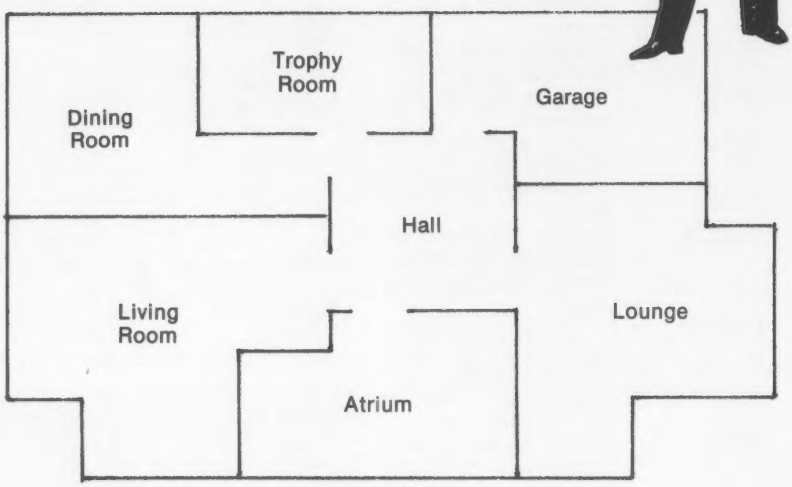
The program was written in BASIC and run with DIGITAL GROUP MAXI BASIC. Only standard BASIC statements were used to insure portability to other versions of BASIC.

Even if the game is not played with hard copy, the user will need pencil and paper to keep track of the times, places and alibis of the suspects in the house.

A murder has occurred in the guest house. One of the guests (random) has killed the host during the time 1 - 9 pm (random). The Great Homicide Detective, Inspector Clew-So is allowed to ask the suspects, Bill, Mary, John, Suzy, or Paul for their location in the house at a particular time. The suspect will answer, and also say who was with them and who they saw in adjacent rooms. Also as a further check, or as a different approach, the Inspector may ask the suspect, at what time(s) were they in an individual room. The suspects move from room to room each hour. The guilty person will lie (randomly) about his/her whereabouts and the condition of the victim.

The Inspector must collect and analyze enough answers to determine who is lying and, thus, who is the guilty person. Then the inspector has to narrow down the location and time of the murder. When the Inspector has part of the crime solved, (suspect, room, or time) this may be confirmed or rejected with a direct confrontation. If the Inspector is completely flabbergasted and resigns, then the facts that eluded the Inspector during the questioning are displayed.

Ronald J. Carlson, 44825 Kirk Ct., Canton, MI 48187.



GUEST HOUSE

	GARAGE	TROPHY	DINING	LIVING	ATRIUM	LOUNGE
1						
2						
3						
4						
5						
6						
7						
8						
9						

MURDERER -------
TIME -------
ROOM -------

MAJOR VARIABLES
C keeps track of the number of questions.
C1 keeps track of the number of confrontations.
P(5,9) represents the position in the house for all 5 suspects for the hours 1-9.

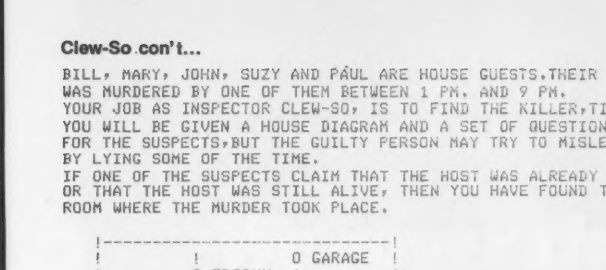
THE NEXT THREE VARIABLES ARE RANDOMLY ASSIGNED
M killer (1-5)
T time (1-9) of the murder
R room location (1-6), determined by P(M,T)

S$ = "BILLMARYPAULSUZYJOHN"... five, four letter names
R$ = "LOUNGEATRIUMLIVINGDININGTROPHYGARAGE"... six, six letter rooms

FNA$ suspect number --- name
or
room number --- name
FNB name --- suspect number or room number

Clew-So con't...

```
BILL, MARY, JOHN, SUZY AND PAUL ARE HOUSE GUESTS.THEIR HOST
WAS MURDERED BY ONE OF THEM BETWEEN 1 PM. AND 9 PM.
YOUR JOB AS INSPECTOR CLEW-SO, IS TO FIND THE KILLER,TIME & ROOM
YOU WILL BE GIVEN A HOUSE DIAGRAM AND A SET OF QUESTIONS
FOR THE SUSPECTS,BUT THE GUILTY PERSON MAY TRY TO MISLEAD YOU,
BY LYING SOME OF THE TIME.
IF ONE OF THE SUSPECTS CLAIM THAT THE HOST WAS ALREADY DEAD,
OR THAT THE HOST WAS STILL ALIVE, THEN YOU HAVE FOUND THE
ROOM WHERE THE MURDER TOOK PLACE.
```




```
INSPECTOR CLEW-SO WHO IS YOUR SUSPECT ? BILL

DO YOU WISH TO QUESTION BILL ABOUT :
   1   - THE SUSPECTS WHEREABOUTS AT A PARTICULAR TIME
   2   - WHAT TIME THE SUSPECT WAS IN A CERTAIN ROOM
   3   - THE CRIME IS SOLVED ---1
BILL     WHERE WERE YOU AT 1
I WAS IN THE GARAGE ROOM.
I SAW SUZY
INSPECTOR CLEW-SO WHO IS YOUR SUSPECT ? SUZY

DO YOU WISH TO QUESTION SUZY ABOUT :
   1   - THE SUSPECTS WHEREABOUTS AT A PARTICULAR TIME
   2   - WHAT TIME THE SUSPECT WAS IN A CERTAIN ROOM
   3   - THE CRIME IS SOLVED ---1
SUZY     WHERE WERE YOU AT 1
I WAS IN THE TROPHY ROOM.
I SAW BILL
I SAW PAUL
INSPECTOR CLEW-SO WHO IS YOUR SUSPECT ? PAUL

DO YOU WISH TO QUESTION PAUL ABOUT :
   1   - THE SUSPECTS WHEREABOUTS AT A PARTICULAR TIME
   2   - WHAT TIME THE SUSPECT WAS IN A CERTAIN ROOM
   3   - THE CRIME IS SOLVED ---2
PAUL      WHAT TIME WERE YOU IN [ROOM] DINING
I WAS IN THAT ROOM AT  1
INSPECTOR CLEW-SO WHO IS YOUR SUSPECT ? PAUL

DO YOU WISH TO QUESTION PAUL ABOUT :
   1   - THE SUSPECTS WHEREABOUTS AT A PARTICULAR TIME
   2   - WHAT TIME THE SUSPECT WAS IN A CERTAIN ROOM
   3   - THE CRIME IS SOLVED ---1
PAUL     WHERE WERE YOU AT 2
I WAS IN THE TROPHY ROOM.
INSPECTOR CLEW-SO WHO IS YOUR SUSPECT ? MARY

DO YOU WISH TO QUESTION MARY ABOUT :
   1   - THE SUSPECTS WHEREABOUTS AT A PARTICULAR TIME
   2   - WHAT TIME THE SUSPECT WAS IN A CERTAIN ROOM
   3   - THE CRIME IS SOLVED ---1
MARY     WHERE WERE YOU AT 2
I WAS IN THE ATRIUM ROOM.
I SAW BILL
I WAS WITH SUZY
I SAW JOHN
INSPECTOR CLEW-SO WHO IS YOUR SUSPECT ? BILL

DO YOU WISH TO QUESTION BILL ABOUT :
   1   - THE SUSPECTS WHEREABOUTS AT A PARTICULAR TIME
   2   - WHAT TIME THE SUSPECT WAS IN A CERTAIN ROOM
   3   - THE CRIME IS SOLVED ---1
BILL     WHERE WERE YOU AT 2
OUR HOST WAS STILL ALIVE.
I WAS IN THE ATRIUM ROOM.
I WAS WITH MARY
I WAS WITH SUZY
I SAW JOHN
INSPECTOR CLEW-SO WHO IS YOUR SUSPECT ? BILL

DO YOU WISH TO QUESTION BILL ABOUT :
   1   - THE SUSPECTS WHEREABOUTS AT A PARTICULAR TIME
   2   - WHAT TIME THE SUSPECT WAS IN A CERTAIN ROOM
   3   - THE CRIME IS SOLVED ---2
BILL      WHAT TIME WERE YOU IN [ROOM] ATRIUM
I WAS IN THAT ROOM AT  3
I WAS IN THAT ROOM AT  7
I WAS IN THAT ROOM AT  9
INSPECTOR CLEW-SO WHO IS YOUR SUSPECT ? BILL

DO YOU WISH TO QUESTION BILL ABOUT :
   1   - THE SUSPECTS WHEREABOUTS AT A PARTICULAR TIME
   2   - WHAT TIME THE SUSPECT WAS IN A CERTAIN ROOM
   3   - THE CRIME IS SOLVED ---1? 3
INSPECTOR DO YOU THINK YOU KNOW :
  1   KILLER
  2   ROOM
  3   TIME
  4   TOTALLY BAFFLED ---1
THE KILLER IS ? BILL
YOU HAVE THE KILLER, INSPECTOR CLEW-SO.
INSPECTOR CLEW-SO WHO IS YOUR SUSPECT ? BILL

DO YOU WISH TO QUESTION BILL ABOUT :
   1   - THE SUSPECTS WHEREABOUTS AT A PARTICULAR TIME
   2   - WHAT TIME THE SUSPECT WAS IN A CERTAIN ROOM
   3   - THE CRIME IS SOLVED ---2
BILL      WHAT TIME WERE YOU IN [ROOM] LIVING
I WAS IN THAT ROOM AT  4
INSPECTOR CLEW-SO WHO IS YOUR SUSPECT ? BILL

DO YOU WISH TO QUESTION BILL ABOUT :
   1   - THE SUSPECTS WHEREABOUTS AT A PARTICULAR TIME
   2   - WHAT TIME THE SUSPECT WAS IN A CERTAIN ROOM
   3   - THE CRIME IS SOLVED ---2
BILL      WHAT TIME WERE YOU IN [ROOM] TROPHY
I WAS IN THAT ROOM AT  6
INSPECTOR CLEW-SO WHO IS YOUR SUSPECT ? BILL

DO YOU WISH TO QUESTION BILL ABOUT :
   1   - THE SUSPECTS WHEREABOUTS AT A PARTICULAR TIME
   2   - WHAT TIME THE SUSPECT WAS IN A CERTAIN ROOM
   3   - THE CRIME IS SOLVED ---2
BILL      WHAT TIME WERE YOU IN [ROOM] DINING
I WAS IN THAT ROOM AT  4
INSPECTOR CLEW-SO WHO IS YOUR SUSPECT ? BILL

DO YOU WISH TO QUESTION BILL ABOUT :
   1   - THE SUSPECTS WHEREABOUTS AT A PARTICULAR TIME
   2   - WHAT TIME THE SUSPECT WAS IN A CERTAIN ROOM
   3   - THE CRIME IS SOLVED ---3
INSPECTOR DO YOU THINK YOU KNOW :
  1   KILLER
  2   ROOM
  3   TIME
  4   TOTALLY BAFFLED ---2
ROOM OF THE MURDER GARAGE
INSPECTOR CLEW-SO YOU ARE A BUMBLING IDIOT.TRY AGAIN
INSPECTOR CLEW-SO WHO IS YOUR SUSPECT ? BILL

DO YOU WISH TO QUESTION BILL ABOUT :
   1   - THE SUSPECTS WHEREABOUTS AT A PARTICULAR TIME
   2   - WHAT TIME THE SUSPECT WAS IN A CERTAIN ROOM
   3   - THE CRIME IS SOLVED ---1
BILL     WHERE WERE YOU AT 2
THE HOST WAS ALREADY DEAD.
I WAS IN THE GARAGE ROOM.
I SAW PAUL
INSPECTOR CLEW-SO WHO IS YOUR SUSPECT ? PAUL

DO YOU WISH TO QUESTION PAUL ABOUT :
   1   - THE SUSPECTS WHEREABOUTS AT A PARTICULAR TIME
   2   - WHAT TIME THE SUSPECT WAS IN A CERTAIN ROOM
   3   - THE CRIME IS SOLVED ---1
PAUL     WHERE WERE YOU AT 2
I WAS IN THE TROPHY ROOM.
INSPECTOR CLEW-SO WHO IS YOUR SUSPECT ? BILL

DO YOU WISH TO QUESTION BILL ABOUT :
   1   - THE SUSPECTS WHEREABOUTS AT A PARTICULAR TIME
   2   - WHAT TIME THE SUSPECT WAS IN A CERTAIN ROOM
   3   - THE CRIME IS SOLVED ---2
BILL      WHAT TIME WERE YOU IN [ROOM] LOUNGE
I WAS IN THAT ROOM AT  2
I WAS IN THAT ROOM AT  4
INSPECTOR CLEW-SO WHO IS YOUR SUSPECT ? BILL

DO YOU WISH TO QUESTION BILL ABOUT :
   1   - THE SUSPECTS WHEREABOUTS AT A PARTICULAR TIME
   2   - WHAT TIME THE SUSPECT WAS IN A CERTAIN ROOM
   3   - THE CRIME IS SOLVED ---3
INSPECTOR DO YOU THINK YOU KNOW :
  1   KILLER
  2   ROOM
  3   TIME
  4   TOTALLY BAFFLED ---2
ROOM OF THE MURDER LOUNGE
INSPECTOR , YOU NOW HAVE THE ROOM.
INSPECTOR CLEW-SO WHO IS YOUR SUSPECT ? BILL

DO YOU WISH TO QUESTION BILL ABOUT :
   1   - THE SUSPECTS WHEREABOUTS AT A PARTICULAR TIME
   2   - WHAT TIME THE SUSPECT WAS IN A CERTAIN ROOM
   3   - THE CRIME IS SOLVED ---3
INSPECTOR DO YOU THINK YOU KNOW :
  1   KILLER
  2   ROOM
  3   TIME
  4   TOTALLY BAFFLED ---3
TIME OF THE MURDER 2
INSPECTOR YOU HAVE THE RIGHT TIME.
YOU ARE BRILLIANT INSPECTOR CLEW-SO.
IT TOOK YOU  17 QUESTIONS AND  4CONFRONTATIONS.
DO YOU WANT A NEW CASE INSPECTOR ? NO
```

Clew-So con't...

```
10DIM S$(20), R$(36), A$(3), P(5,9), Z$(36), Y$(36) , M$(36)
20REM*****************************************
30REM*                                       *
40REM*     INSPECTOR CLEW-SO                 *
50REM*     BY: RON CARLSON                   *
60REM*     FEB. 1979                         *
70REM*                                       *
80REM*****************************************
90S$="BILLMARYPAULSUZYJOHN"
100R$="LOUNGEATRIUMLIVINGDININGTROPHYGARAGE"
110DEF FNA$(M$,P,O)=M$((P-1)*O+1,P*O)
120DEF FNB(Z$,Y$,L,H)
130FORA=1TOH
140IFZ$<>FNA$(Y$,A,L) THEN170
150P=A
160EXIT190
170NEXTA
180P=0
190RETURNP
200FNEND
210PRINT"BILL, MARY, JOHN, SUZY AND PAUL ARE HOUSE GUESTS.THEIR HOST "
220PRINT"WAS MURDERED BY ONE OF THEM BETWEEN 1 PM. AND 9 PM."
230PRINT"YOUR JOB AS INSPECTOR CLEW-SO, IS TO FIND THE KILLER,TIME & ROOM."
240PRINT"YOU WILL BE GIVEN A HOUSE DIAGRAM AND A SET OF QUESTIONS"
250PRINT"FOR THE SUSPECTS,BUT THE GUILTY PERSON MAY TRY TO MISLEAD YOU,"
260PRINT"BY LYING SOME OF THE TIME."
270PRINT"IF ONE OF THE SUSPECTS CLAIM THAT THE HOST WAS ALREADY DEAD,"
280PRINT"OR THAT THE HOST WAS STILL ALIVE, THEN YOU HAVE FOUND THE"
290PRINT"ROOM WHERE THE MURDER TOOK PLACE."
300 PRINT
310H=0
320C=0
330C1=0
340PRINT"   !------------------------------!"
350PRINT"   !          !         O GARAGE  !"
360PRINT"   !        O TROPHY  !           !"
370PRINT"   ! DINING  !---!--  -!  --      !"
380PRINT"   !                    !-----!   O  (WINDOWS)"
390PRINT"   !--O----------!         -!     !"
400PRINT"   !                       !---"
410PRINT"   !              !--  -------       !"
420PRINT"   ! LIVING   ---!          !        !"
430PRINT"   !--          !          O LOUNGE !"
440PRINT"     !        O  ATRIUM     !   ----!"
450PRINT"     !--------!------------!----!"
460FORK=1TO5
470P(K,1)=INT(6*RND(K))+1
480NEXTK
490FORL=2TO9
500FORK=1TO5
510A=INT(6*RND(K))+1
520IFA=P(K,L-1)THEN510
530P(K,L)=A
540NEXTK
550NEXTL
560REM ESTABLISHED SUSPECT'S MOVEMENTS
570 REM RANDOM ASSIGNMENT OF KILLER,TIME AND ROOM
580M=INT(5*RND(1))+1
590T=INT(9*RND(2))+1
600R=P(M,T)
610INPUT"INSPECTOR CLEW-SO WHO IS YOUR SUSPECT ? ",S1$
620S=FNB(S1$,S$,4,5)
630IFS=0THEN610
640PRINT
650PRINT"DO YOU WISH TO QUESTION ";S1$;" ABOUT :"
660PRINT"   1   - THE SUSPECTS WHEREABOUTS AT A PARTICULAR TIME"
670PRINT"   2   - WHAT TIME THE SUSPECT WAS IN A CERTAIN ROOM"
680INPUT"   3   - THE CRIME IS SOLVED ---",A
690IF A<1 OR A>3 THEN650
700C=C+1
710ON A GOTO 720,990,1200
720PRINT S1$,
730 REM TIME SECTION
740INPUT "WHERE WERE YOU AT ",T1
750IF T1<1 OR T1>9 THEN740
760R1=P(S,T1)
770IFS<>M THEN860
780 REM LIAR SECTION
790IFRND(2)<.5THEN910
800R1=INT(6*RND(3))+1
810IF RND(4)<.5 THEN 840
820PRINT"THE HOST WAS ALREADY DEAD."
830GOTO910
840PRINT"OUR HOST WAS STILL ALIVE."
850GOTO910
860IFR1=RTHEN880
870GOTO910
880IFRND(5)<.5 THEN910
890IF T1 < T THEN PRINT" THE HOST WAS STILL ALIVE."
900IF T1 > T THEN PRINT" THE HOST WAS ALREADY DEAD."
910PRINT"I WAS IN THE ";FNA$(R$,R1,6);" ROOM."
920FORK=1TO5
930IFK=S THEN960
940IF P(K,T1)=R1 THEN PRINT"I WAS WITH ";FNA$(S$,K,4)
950IF ABS(R1-P(K,T1))=1 THEN PRINT"I SAW ";FNA$(S$,K,4)
960NEXTK
970GOTO610
980REM ROOM QUESTIONING
990PRINT S1$,
1000INPUT " WHAT TIME WERE YOU IN [ROOM] ",R1$
1010T1=FNB(R1$,R$,6,6)
1020IFT1=0THEN1000
1030IFS<>M THEN1110
1040IFRND(5)<.5THEN1110
1050T1=INT(RND(5)*6)+1
1060GOTO1090
1070IF T1=F THEN PRINT"I WAS NOT IN THAT ROOM."
1080GOTO610
1090PRINT"I WAS IN THAT ROOM AT ";T1
1100GOTO610
1110K=0
1120FORB=1TO9
1130IF P(S,B)<>T1 THEN 1160
1140PRINT"I WAS IN THAT ROOM AT ";B
1150K=1
1160NEXTB
1170IF K=0 THEN PRINT"I WAS NOT IN THAT ROOM."
1180GOTO610
1190REM CONFRONTATION SECTION
1200C1=C1+1
1210PRINT"INSPECTOR DO YOU THINK YOU KNOW :"
1220PRINT"  1   KILLER"
1230PRINT"  2   ROOM"
1240PRINT"  3   TIME"
1250INPUT"  4   TOTALLY BAFFLED ---",A
1260 ON A GOTO 1270,1420,1350, 1550
1270INPUT" THE KILLER IS ? ",S1$
1280X=FNB(S1$,S$,4,5)
1290IFX=0THEN1210
1300IF S1$<> FNA$(S$,M,4) THEN 1530
1310PRINT"YOU HAVE THE KILLER, INSPECTOR CLEW-SO."
1320H=H+1
1330IF H=3 THEN 1500
1340GOTO610
1350INPUT "TIME OF THE MURDER ",T1
1360IF T1<1 OR T1>9 THEN1350
1370IF T1<>T THEN 1530
1380PRINT"INSPECTOR YOU HAVE THE RIGHT TIME."
1390H=H+1
1400IF H=3 THEN 1500
1410GOTO610
1420INPUT "ROOM OF THE MURDER ",R1$
1430X=FNB(R1$,R$,6,6)
1440IFX=0THEN 1420
1450IF R1$<>FNA$(R$,R,6)THEN 1530
1460PRINT"INSPECTOR , YOU NOW HAVE THE ROOM."
1470H=H+1
1480IF H<>3 THEN 610
1490 REM CONFIRMATIONS
1500PRINT"YOU ARE BRILLIANT INSPECTOR CLEW-SO."
1510PRINT"IT TOOK YOU "?C;" QUESTIONS AND "?C1;"CONFRONTATIONS."
1520GOTO1590
1530PRINT"INSPECTOR CLEW-SO YOU ARE A BUMBLING IDIOT.TRY AGAIN"
1540GOTO610
1550PRINT"TOO BAD INSPECTOR CLEW-SO"
1560PRINT" THE FACTS ARE:"
1570PRINTFNA$(S$,M,4);" KILLED THE HOST AT ";T;" O'CLOCK IN THE ";
1580 PRINT FNA$(R$,R,6);" (ROOM)"
1590INPUT"DO YOU WANT A NEW CASE INSPECTOR ? ",A$
1600IF A$="YES" THEN 210
1610END
```

LATE-BREAKING MICROCOMPUTER
PRODUCT NEWS, SOFTWARE RELEASES,
NEW MICRO PERIPHERALS . . .

We cover the micro world as only a newspaper can— every week.

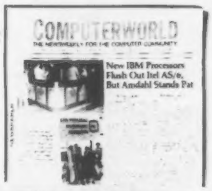
Monthly Magazines are great for in-depth articles and detailed technical information—and we're not suggesting you stop reading this one. What we *are* suggesting is that we can give you a lot that a magazine can't.

First, we're a newspaper—which means we cover a lot of things briefly, instead of a few things deeply.

Second, we're weekly—so you won't be saying "I wish I had known about that" when you hear someone talking about new micro hardware and software.

Third, we're into all aspects of computers; so you don't have to limit your information to micros. We cover everything from industry news to data processing to ethical issues, as only a newspaper can.

Fourth, we'll send you 52 issues for about 49c a week with a one-year subscription (less than half the newsstand price). Just use the form below to start your subscription coming. It's a fast way to stay ahead.



CIRCLE 134 ON READER SERVICE CARD

Please send me **COMPUTERWORLD** *for 1 year.* RATES: U.S. - $25 Canada and PUAS - $35 Europe & Middle East - $75 All Other Foreign - $125

☐ Check Enclosed
☐ Am Ex ☐ BA/Visa ☐ MC (MC Only - List four digits above your name)

If charge we must have cardholder's signature: _____ Expiration Date: _____

First Initial		Middle Initial		Surname			
Your Title							
Company Name							
Send to: Address							
City					State	Zip Code	

Address shown is ☐ *Business* ☐ *Home.*

☐ Check here if you do not wish to receive promotional mail from *Computerworld.*

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

CIRCULATION DEPT. H, 797 Washington Street, Newton, MA 02160

PLEASE CIRCLE 1 NUMBER IN EACH CATEGORY

BUSINESS/INDUSTRY
10 Manufacturer of Computer or DP Hardware/Peripherals
20 Manufacturer (other)
30 DP Service Bureau/Software/Planning/Consulting
40 Public Utility/Communication Systems/Transportation
50 Wholesale/Retail Trade
60 Finance/Insurance/Real Estate
70 Mining/Construction/Petroleum/Refining
75 Business Service (except DP)
80 Education/Medicine/Law
85 Government-Federal/State/Local
90 Printing/Publishing/Other Communication Service
95 Other: _____

TITLE/OCCUPATION/FUNCTION
11 President/Owner/Partner/General Manager
12 VP/Assistant VP
13 Treasurer/Controller/Finance Officer
21 Director/Manager of Operation/Planning/Administrative Service
22 Director/Manager/Supervisor DP
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
41 Application Engineer
42 Other Engineering
51 Mfg. Sales Representative
52 Other Sales/Marketing
60 Consultant
70 Lawyer/Accountant
80 Librarian/Educator/Student
90 Other: _____

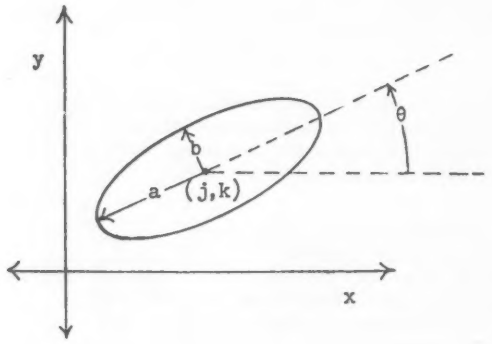
You can call in your subscription with your credit card. Call 1 (800) 325-3080.

Inkblot

INKBLOT is a program that creates "inkblots" similar to those used in the famous Rorschach Inkblot Test. The program generates these inkblots randomly so that literally millions of different patterns can be produced. Many of these patterns are quite interesting and serve not only as conversation pieces, but also as good examples of computer "art."

In addition, INKBLOT is interesting from a mathematical point of view. This is because INKBLOT actually creates inkblots by plotting ellipses on the left side of the page and their mirror-images on the right side. The program first chooses the ellipses to be plotted by randomly selecting the values a, b, j, k and θ in the equation for a rotated ellipse:

$$\frac{[(x-j)\cos\theta + (y-k)\sin\theta]^2}{a^2} + \frac{[(y-k)\cos\theta - (x-j)\sin\theta]^2}{b^2} = 1$$



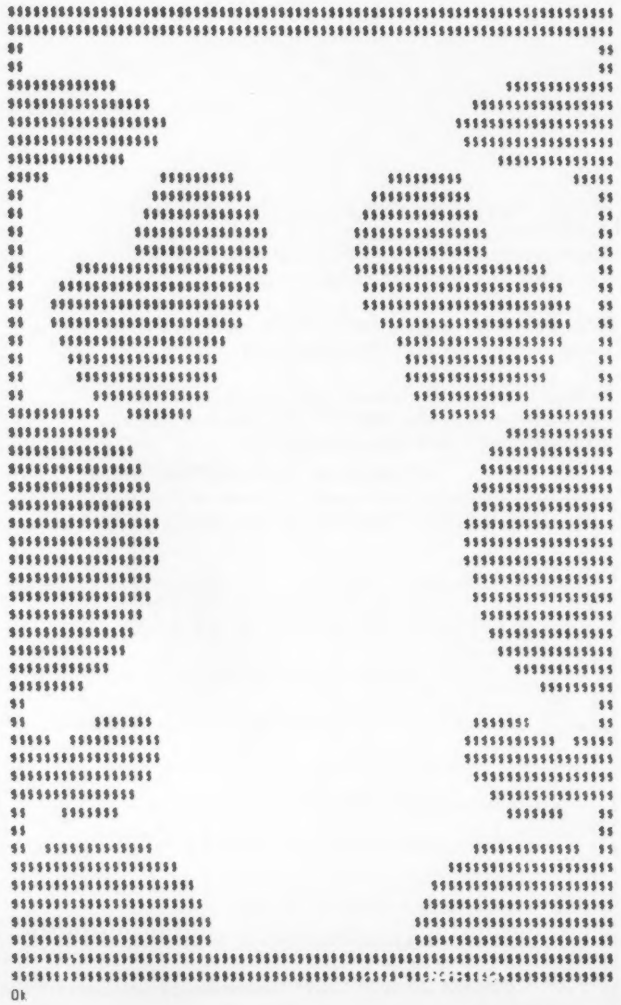
where a = the horizontal radius of the ellipse
b = the vertical radius of the ellipse
j = the distance from the ellipse center to the y-axis
k = the distance from the ellipse center to the x-axis
θ = the angle of rotation in radians

Since the actual method by which the program plots the ellipses is quite complicated, it won't be discussed here.

INKBLOT could be enhanced in several ways, for example allowing the user to specify which character is to be used in printing the inkblot. It could have an option to print the "negative" of an inkblot by filling in the area around the ellipses rather than the ellipses themselves. Finally, it is possible to build in a "repeatable randomness" feature so that exceptional outputs could be reproduced at any time. These enhancements are left for the ambitious programmer to make.

Program and description are by Scott Costello.

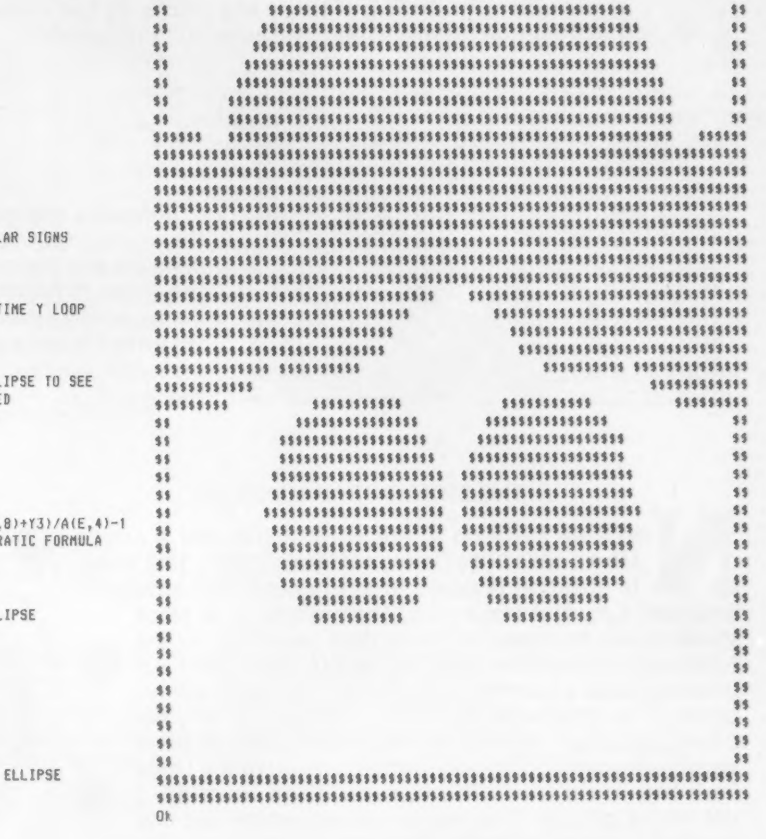
```
RUN

                 INKBLOT
            CREATIVE COMPUTING
          MORRISTOWN, NEW JERSEY
```



```
Ok
```

```
LIST
100 PRINT TAB(26);"INKBLOT"
105 PRINT TAB(20);"CREATIVE COMPUTING"
110 PRINT TAB(18);"MORRISTOWN, NEW JERSEY"
115 PRINT:PRINT:PRINT
120  REM *** WORKS BY PLOTTING ELLIPSES AND THEIR MIRROR IMAGES
130 DIM A (12,13),B$(36),A$(36)
140  REM *** CHOOSE FROM 5 TO 12 ELLIPSES
150  M=INT(8*RND(1))+5
160  REM *** CREATE SIZE, LOCATION AND ANGLE OF M ELLIPSES
170  FOR L=1 TO M
180  A(L,1)=34*RND(1)
190  A(L,2)=80*RND(1)
200  A(L,3)=(15*RND(1)+2)^2
210  A(L,4)=(15*RND(1)+2)^2
220  T=3.14159*RND(1)
230  A(L,5)=COS(T)
240  A(L,6)=SIN(T)
250  A(L,7)=A(L,5)*A(L,6)
260  A(L,5)=A(L,5)*A(L,5)
270  A(L,6)=A(L,6)*A(L,6)
280  A(L,8)=A(L,1)*A(L,1)*A(L,6)
290  A(L,9)=A(L,1)*A(L,1)*A(L,5)
300  A(L,10)=A(L,1)*A(L,7)
310  A(L,11)=-2*A(L,1)*A(L,6)
320  A(L,12)=-2*A(L,1)*A(L,5)
330  A(L,13)=A(L,6)/A(L,4)+A(L,5)/A(L,3)
340  NEXT L
350  REM *** PRINT TOP BORDER;  B$ CONTAINS 36 DOLLAR SIGNS
360  B$="$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$"
370  PRINT B$;B$
380  PRINT B$;B$
390  REM *** LOOP Y IS Y-COORDINATE OF PLOT; EACH TIME Y LOOP
400  REM *** IS EXECUTED, A LINE IS PRINTED
410  FOR Y=79.9 TO 0 STEP -1.6
420  A$="$$                                  "
430  REM *** LOOP E CHECKS THE EQUATION OF EACH ELLIPSE TO SEE
440  REM *** IF IT INTERSECTS THE LINE TO BE PRINTED
450  FOR E=1 TO M
460  Y1=Y-A(E,2)
470  Y2=Y1*Y1
480  Y3=Y1*A(E,10)
490  Y4=Y1*A(E,7)
500  B=(A(E,12)+Y4)/A(E,3)+(-Y4+A(E,11))/A(E,4)
510  C=(Y2*A(E,6)+A(E,9)-Y3)/A(E,3)+(Y2*A(E,5)+A(E,8)+Y3)/A(E,4)-1
520  REM *** R IS THE RADICAL IN THE STANDARD QUADRATIC FORMULA
530  R=B*B-4*A(E,13)*C
540  IF R<0 THEN 690
550  R=SQR(R)
560  REM *** FIND WHERE THE LINE INTERSECTS THE ELLIPSE
570  R1=INT(-(B+R)/2/A(E,13)+1)
580  IF R1>34 THEN 690
590  R2=INT((R-B)/2/A(E,13))
600  IF R2<1 THEN 690
610  IF R2<35 THEN 630
620  R2=34
630  IF R1>0 THEN 660
640  R1=1
650  REM *** FILL IN THE LINE WHERE IT CROSSES THE ELLIPSE
660  FOR J=R1+2 TO R2+2
670 A$=LEFT$(A$,J-1)+"$"+RIGHT$(A$,LEN(A$)-J)
680  NEXT J
690  NEXT E
700  REM *** PRINT LINE
710  PRINT A$;
720 FOR K=36 TO 1 STEP -1
730 PRINT MID$(A$,K,1);
740  NEXT K
750  NEXT Y
760  REM *** PRINT BOTTOM BORDER
770  PRINT B$;B$
780  PRINT B$;B$
790  END
Ok
```

```
RUN
                    INKBLOT
                CREATIVE COMPUTING
              MORRISTOWN, NEW JERSEY
```



Ok

Inkblot is reprinted from the new book, More Basic Computer Games which contains 90 new, fascinating games in Microsoft Basic. Reserve your copy by sending $7.50 plus $1.00 shipping and handling in USA ($2.00 foreign) to Creative Computing, P.O. Box 789-M, Morristown, N.J. 07960. Visa, MasterCharge and American Express okay.

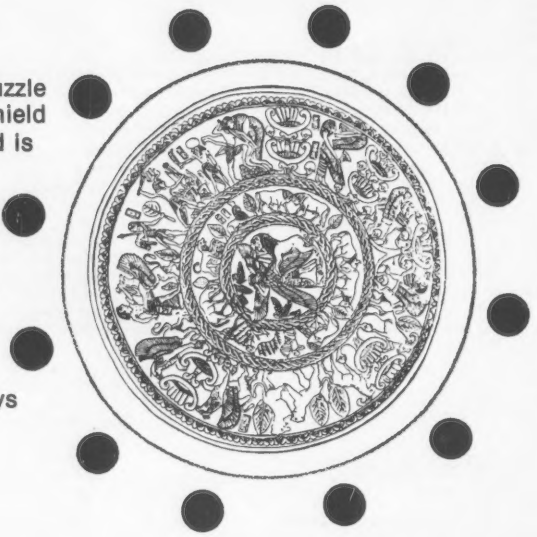
puzzles & problems

Puzzles from the ancient past are the subjects of this month's round of "Puzzles and Problems" from Merlin the Magician. He went over to New York the other day to view the Treasures of King Tut, and returned babbling of times and places he had visited in his youth. Appropriately, we will start off with a riddle from that royal guardian, the Sphinx!

"What is the longest and yet the shortest thing in the world; the swiftest and the slowest; the most divisible and the most extended; the least valued and the most regretted; without which nothing can be done; which devours everything, however small, and yet gives life and spirit to all things, however great?"

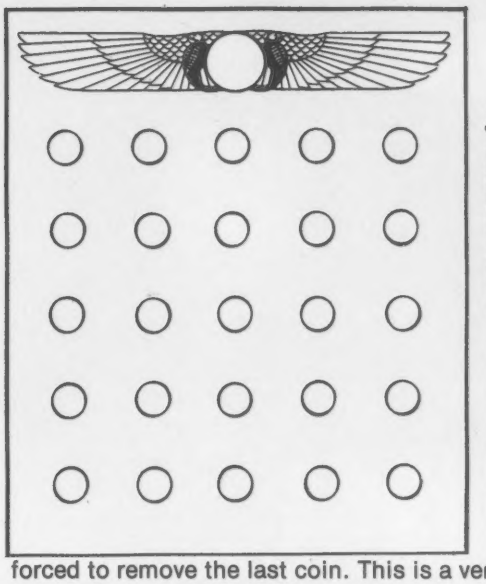
THE SHIELD OF HAMMURABI

Next, we move on to ancient Babylon and a puzzle Merlin calls "The Shield of Hammurabi". The shield in question is depicted at the right. The shield is encircled by twelve black dots. The problem is to place eleven coins on eleven of these dots according to the following instructions. Starting at any dot, count six dots and place a coin on the sixth dot. You must always count in a clockwise direction. Starting at another empty dot count around the circle and place another coin on an empty dot. Continue this until all of the coins have been placed on different dots. When counting, a dot with a coin on it is treated like an empty dot and counted along with the rest. Remember, you must always start counting at an empty dot.



THE MEDUSA'S REVENGE

Here is a problem that, if you stare at it long enough, may turn your brain to stone, or, at the very least, to the consistency of Play-Dough. The marble monument, to the left, is decorated with the head of Medusa. Disregarding the lovely lady for a moment you are to divide this mitred monument into four parts, all of the same shape and size.



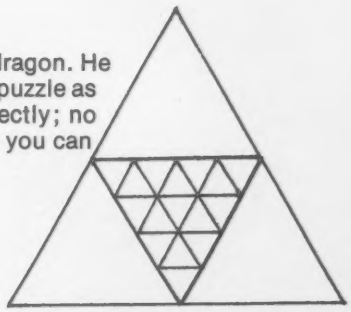
The Koins of Karnak

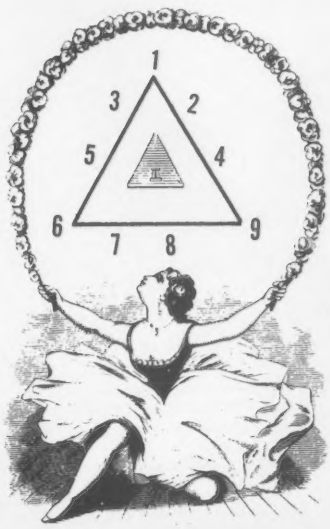
overs of games step forward and listen well. From a far-off land Merlin brings to us an ingenious game he calls "The Koins of Karnak." It is named after the vast temple complex that was at the center of that famous city of ancient Egypt, Thebes. Now, Merlin claims that they played this game over 3000 years ago. Since I wasn't there I'll not dispute his word. To set up the game, lay out twenty-five coins in five rows of five coins each. (On a piece of cardboard draw the game board pictured to the left). Play alternates between players. In your turn you can remove any number of coins from any row or column. There cannot be, however, a gap between any of the coins removed. For example, if I remove the middle three coins in the top row my opponent cannot remove the two end coins on the left and right. He can, however, remove either one of them. Play continues until all of the coins have been removed. The loser is the player who is forced to remove the last coin. This is a very popular old game and Merlin feels that you should have many enjoyable hours attempting to master it.

One last thought before leaving this game. When you have become proficient with this game, try it with six coins in six rows, or, four coins in eight rows. The possibilities are limitless.

Pyramid Puzzle

The first problem is from the brush of Merlin's court artist, Ector Pendragon. He calls it Pendragon's Perplexing Pyramid Puzzle. It is not a very hard puzzle as puzzles go, but you are given only one opportunity to answer it correctly; no second chances please. You are to add up all of the equilateral triangles you can find in the painting. Be careful, it's easy to miss one or two.



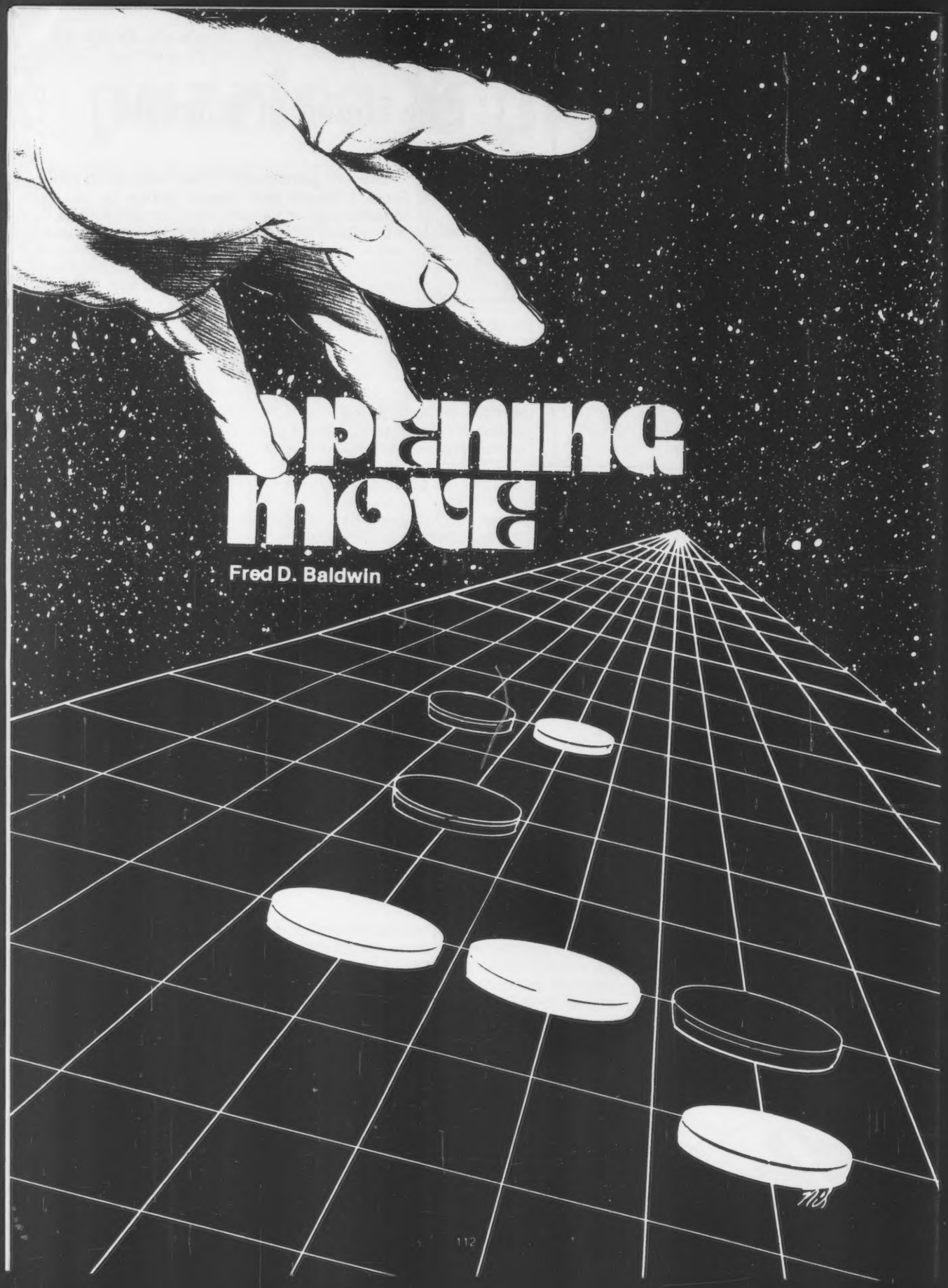


Problem two is called the "Magic Pyramid" and is depicted at the left. The puzzle is to rearrange the numbers 1 through 9, that are printed around the three sides of the pyramid so that the total of the four numbers along any one side will be 17. The numbers at the corners will, of course, be included in the totals of the adjacent sides.

Our last puzzle is called "The Case of the Busted Pyramid". The problem is to rearrange the three pieces pictured below to form a perfect pyramid. This may prove to be harder than it looks.

The puzzles presented here are from the books "Merlin's Puzzler" and "Merlin's Puzzler 2" by Charles Barry Townsend.

Answers
on page 160


OPENING MOVE
Fred D. Baldwin

Keeping a guilty ear cocked for the sound of anyone's approach, Shoji Fujimoto leaned forward over the computer console. At 8:10 a.m. he was alone in the communications room. With a dexterity born of long practice, he typed in a code number.

READY.

The word flickered on the videoscreen before him. He typed in a reply.

ETICOM 4.4. PRINT.

An instant later the screen shimmered to life. A blank grid appeared, nineteen lines square. Underneath the grid appeared two words:

YOUR MOVE.

The electronics equipment around him faded from Shoji's consciousness. He concentrated for a moment, then typed:

11,9.

A tiny "x" twinkled onto the grid, eleven spaces to the right and nine up. After several seconds, the screen flashed back:

11,10. YOUR MOVE.

A tiny "o" appeared just above the "x". After several such exchanges, the "x's" and the "o's" intertwined like snakes, but the "x's" soon began to gobble up the "o's." Shoji frowned in concentration. He was so absorbed in the pattern before him that he had forgotten to listen for footsteps.

"So this is how you do instrument checks!"

The voice came from directly behind him. Shoji jerked upright and turned to see Alice Schaeffer laughing at him. He flushed to the roots of his dark hair, then relaxed in relief. Alice was his own age, twenty-four. Like him, she was a junior programmer on the staff of NASARAL, the National Aeronautics and Space Administration's Laboratory for Radio Astronomy, a processing center for data collected from a network of data observatories.

"You scared me," he said. "I though you might be Dr. Anderson."

"You know what he'd do to you if he caught you goofing off again. What is it this time?"

"I finished my test runs early. I'm trying to teach this dumb machine to play a decent game of 'Go,' " explained Shoji.

"I should have known it would be something like that," Alice said. "How's it doing?"

"It's going terribly," he said, as she grimaced to acknowledge the pun. "Teaching it the rules was easy. A child can learn them in ten minutes. But good play requires an intuitive grasp of some relationships I haven't been able to program in."

"You'd better program yourself to get serious," she said. "What if Dr. Anderson catches you?"

"His bark is worse than his bite. Besides, he won't catch me. My game program is hidden in a place where no one will find it."

"Where?"

"That would be telling," he teased. "I promise you that it can't do any harm. Let's just say I've got it stored in an out-of-the-way corner of an electronic attic."

Shoji had reason for his confidence. He had stored his program as a sub-routine of ETICOM, the acronym for Extra-Terrestrial Intelligence Communication Module. ETICOM was a long and pointless program that represented some bureaucratic think tank's notion of what the human race should say upon hearing from intelligent beings from outer space. It had been developed in connection with a NASARAL deep space radio probe some years earlier, but it was generally agreed to have been a waste of government money. Any signal received from outer space would be years, if not centuries, old when it reaching earth. If that ever happened, there would hardly be any rush about replying, and the nature of the reply would certainly be re-thought at the time, depending on the nature of the incoming signal. However, ETICOM's clutter of basic math, symbolic logic, and astrophysical data did make a perfect attic. Shoji smiled at the thought of his little program nestling like a bird in the branching rafters of the larger one.

"Shoji, mark my words, you're going to get yourself in trouble," said Alice, interrupting his reverie. "Now I've got work to do."

"OK, Alice," Shoji laughed, "but I'm just a nice kid from San Francisco who doesn't want to cause anyone trouble."

Alice left. After a lingering look at the videoscreen, Shoji pressed the STORE button on the console. The screen went blank.

Dr. Carl Anderson, Director of NASARAL, made a point of eating lunch at his desk whenever possible. He felt it showed how busy he was, while giving him something of the common touch. Today, as he munched a corned-beef sandwich, he glared at several pages of budget testimony. They were, he thought, a reasonable justification for an increase in NASARAL's appropriations, but he recognized that they were hardly exciting. He wished he had something dramatic to report.

The telephone on his desk rang softly. Since his secretary was having her lunch at the building's cafeteria, he picked it up.

"Anderson here."

"Excuse me, Dr. Anderson," the voice at his ear said. "This is Allen Hammond at the communications room. We've picked up a mystery. It's a non-random signal from an unknown source, and it's getting closer."

"What do you mean, closer?" Anderson asked. "You mean the signal is getting stronger?"

"Yes sir, but more than that. Each signal varies slightly in position, and the time intervals between them are decreasing. Whatever is transmitting them seems to be headed for earth's orbit at an incredible speed."

"Check it all out again carefully," Anderson said. "I'll drop by in a little while."

He finished his sandwich without haste, stood up, and glanced around the room at the photographs lining his walls, mostly of himself in the company of various dignataries. He smoothed his hair and patted down his bushy gray sideburns. It was good to have a chance to take charge of things. Also, it was at least possible that this mysterious signal, though probably from a weather balloon or something equally prosaic, would give him an anecdote to liven up his budget testimony.

The communications room was about thirty feet square; its walls lined with electronic paraphernalia. When Anderson arrived, he found almost a dozen of his staff circled around the big 52-inch videoscreen in the center of the wall facing the door. There was Hammond, the senior communications officer, several junior programmers, and one or two analysts. No one noticed Anderson enter.

"Well, what have we got here?" he asked, a little more loudly than he intended.

For a moment, no one spoke.

"We think it's a spaceship," someone said.

Anderson recognized the speaker as young

Fred D. Baldwin, 316 Glendale St., Carlisle, PA 17013.

Opening, con't....

Fujimoto. Bright, according to Hammond, but not serious.

"Very funny, Mr. Fujimoto," Anderson said. "If you don't mind, however, I'd like someone to review the data for me. I don't want to keep you and the others, though. I'm sure you have other things to do."

Reluctantly, Shoji and several others took the hint and left the room.

Within a few minutes Anderson had the story. The signal — a meaningless but clearly purposeful pattern — was coming in from declination 16 degrees, 38 minutes, South; right ascension, six hours, 43 minutes. Roughly the astronomical coordinates for the star Sirius. It was on a little-used frequency NASARAL had employed several years earlier during an experimental deep space radio probe directed, among other places, toward Sirius. It was a short pattern, repeated at roughly 25-second intervals. All that would have been astonishing enough, but a plot of the incoming signals indicated that they originated from a source that, when first detected, had been moving toward earth at almost 30,000 kilometers per second.

That last number staggered Anderson. It was about ten per cent of the speed of light. The source of the signal appeared to be slowing as it approached, but it was still moving many times faster than anything mankind knew how to make.

He tried to preserve his composure by recalling his responsibilities as director of NASARAL.

"What have we done?" he asked.

"What you see, sir," said Hammond. "All data is being recorded and analyzed. We checked for satellites in the vicinity of the signal source. Nothing. Then I called you."

"Yes," said Anderson. "But have we sent anything back?"

As soon as he heard himself, he felt silly. What should they have said to a strange signal? Yet he felt he could not stop without losing face.

"Well?" he asked.

"No," said Hammond. "Of course not. What would we say?"

The "of course not" grated on Anderson's ears.

"We're supposed to be prepared for this," he said. "If that signal keeps coming, transmit that communications program we've got on file. The one that sounds like 'etiquette.'"

"Yes, sir," said Hammond.

The mysterious signal continued to arrive, and ETICOM went out. Anderson was on the phone constantly during the next hour or so, and NASARAL's staff was busy making connections between the lab's computer and those in NASA Headquarters. Also with the Pentagon. Although only a few people had been told what was happening, those few were deeply troubled.

At the Pentagon, military analysts tried to evaluate the spaceship, if it were a spaceship, as a military threat. A general asked for "viable response options." The answer, when put in plain English, was that there were none. Assume the signal was coming from a spaceship. Nothing was known about its size or mission. Was it a probe? Were living things on board? Was it part of a fleet? Armed? What could be inferred about the nature, range, or destructive power of its weapons? Nothing was known, except that the speed of the ship indicated a technology vastly superior to mankind's own. The general was told that earth had no option but to wait.

Elsewhere in Washington, senior bureaucrats understood sooner than the general that there was nothing they could do. They reduced the problem to "Whom do we tell?". Within the first hour after Anderson's call, NASA notified the White House Science Advisor. The Science Advisor decided to wait a bit before telling the President, who was thus spared for a time the decision of when to tell Congress and the Russians.

Back at NASARAL, scientists and programmers were sensing the enormous difficulty of communicating anything at all, much less anything worth saying, to a totally alien intelligence. ETICOM's logic seemed ponderous and incomprehensible; its star maps and chemical formulae, even if decodable, were hardly appropriate for a visitor at earth's very doorstep.

Shoji, who was one of those called in to stand by — for what was not quite clear — had a special worry of his own. He had, of course, learned of the decision to send out ETICOM, but he had said nothing about his hidden program. The whole thing was silly, he told himself. One more set of meaningless coordinates would not matter, even if the signal had been received, which was perhaps not very likely. Although no one but Alice Schaeffer, who had not been called in, knew of his little game, he was troubled and not reassured by his own rationalizations. When this is over, he thought, I'd better tell Hammond.

Between telephone calls, everyone's eyes kept returning to the main videoscreen, where the incoming signal was displayed as a series of light specks. The pattern was hypnotic.

Then it changed. At the expected time interval, the expected pattern did not appear. Instead, there were words:

ETICOM 4.4. PRINT.

Almost instantly, the screen was illuminated by a shimmering grid.

YOUR MOVE.

"What's happening?" Anderson shouted.

Allen Hammond grabbed the ETICOM program book and started flipping pages.

"There isn't any Section 4.4.!" he shouted back.

Of all those watching, only one person had any idea of what was happening, and he was too horrified to speak. His earlier rationalizations for silence seemed to choke him. How could he explain that he, Shoji Fujimoto, a nice boy from San Francisco, had probably destroyed a once-in-a-lifetime — no, a once-in-all-history — chance to communicate rationally with an intelligence from beyond the stars? My ancestors, he thought, would have committed ritual suicide. The idea did not seem fantastic. Later. Now he had to do something.

YOUR MOVE. YOUR MOVE.

Afterwards there was no way Shoji could explain what compelled him to step forward. He walked over to the transmission console and sat down. Eyes almost closed, he tapped out:

8, 6.

A tiny "x" appeared on the grid. Shoji's own computer program, an impulsive player, would have replied in seconds. Now nothing happened. Anderson, who had just noticed Shoji, said sharply:

"Shoji, what the devil are you doing?"

Shoji could not speak. His eyes were on the screen.

"What are you doing, Shoji?" Anderson's voice was threatening now.

Then, like a new star appearing just past twilight, a small "o" flickered next to the "x".

8, 7. YOUR MOVE, the screen flashed.

Moving slowly, as in a dream, Shoji leaned forward over the computer console.

"Shoji, what are you doing?" This time it was Allen Hammond, speaking softly.

"I. . . **we** are playing 'Go,' " Shoji said.

"This is crazy," said the White House Science Advisor, a man in his late thirties named Duggan, for the twentieth time. "I can't tell the President that!"

Six of them sat in Anderson's picture-lined office: Anderson, Shoji, Hammond, Duggan, a general, and a man in his sixties named Kaplan, who had been introduced as a long-time advisor to the President but who had said nothing after the first handshake. The trio from Washington had flown in that night. It was late and Shoji was exhausted. He knew that no one had decided yet whether or not he should be held responsible for what might be regarded as a disaster.

"Let me get this straight," said Duggan, "this spaceship, or whatever it was, comes out of nowhere after traveling who knows how many light years, approaches earth, plays two games of 'Go' with this. . ." He paused to glare at Shoji. ". . .junior member of your staff, using an unauthorized computer program. It loses one and wins one. Then it makes a giant turn in space and heads back to wherever it came from! That's not crazy?"

"That is about the gist of it," Anderson admitted.

"Do we know whether the ship carried a live occupant or a computer?" asked the general.

"We don't know anything," Anderson said.

"We're pretty sure of one thing," spoke up Kaplan, joining the discussion for the first time. "Whoever or whatever was ultimately responsible for sending that signal likes to play games."

"More craziness!" snorted Duggan.

"That doesn't tell us much, Mr. Kaplan," the general said.

"Doesn't it?" Kaplan asked. "Ever hear of **Homo Ludens?**"

"Homo **who**?"

"Homo Ludens," repeated Kaplan. "Man the player." It's the title of a book by a historian named Huizinga. He believed that most of what we value in life — art, law, philosophy, even religion — can be understood as games. He decided that 'to play' and 'to be civilized' came to nearly the same thing. The essence of 'play' is that it involves making up rules that the players accept as binding. They may be strong enough to break the rules, but they don't because that would spoil the game."

"Very nice," said Duggan, "but why did the thing break off so quickly? It couldn't have come all this way just to play!"

"What else should it have come for?" asked Kaplan. "We were as alien to it as it was to us. What else could either of us possibly have communicated to the other that would have meant anything important?"

He turned to Shoji.

"Mr. Fujimoto," he asked gently, "do you have an opinion?"

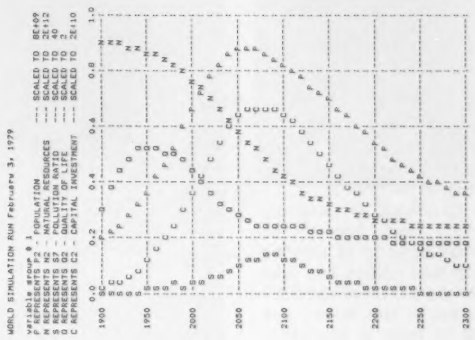
"Not really, sir," said Shoji. "At the time we were playing, I was thinking about nothing else but the game."

Kaplan smiled at Shoji, the first time anyone had smiled for many hours.

"Exactly," he said. "I hope that they got that message." □

WORLD SIMULATION

by James L. Murphy, Ph.D.



A fully interactive ecologic model. Allows manipulation of all system variables. Plots 15 variables in 3 different graphs on any standard printer. Begins in the year 1900 and projects all values at any interval up to selected ending year. Seven variables (Birth Rate, Death Rate, Pollution Ratio, etc.) may be dynamically altered at selected dates within each program run.

All variables and their behavior are fully compatible with Jay W. Forrester's Model WORLD2, as described in *World Dynamics* (Wright-Allen Press, 1971).

Variables graphed:

POPULATION	POLLUTION GENERATED	MATERL STD OF LIV
NAT RESOURC	FOOD RATIO	NAT RESOURC USAGE
POLLUTION RATIO	LIFE EXPECTANCY	CAP INVEST RATIO
QUAL OF LIFE	BIRTH RATE	CAP INVEST RAT. AG.
CAP INVESTMENT	CROWDING RATIO	CAP INV AGRIC FRACT

Two different versions provided on each diskette, both with complete source listings, and manual.

Manual only, with source listings $8.00
5¼" Diskette-North Star BASIC. $28.00
8" Diskette-CBASIC $32.00

At your computer store, or from

Berkeley Medical Data Associates, Inc.

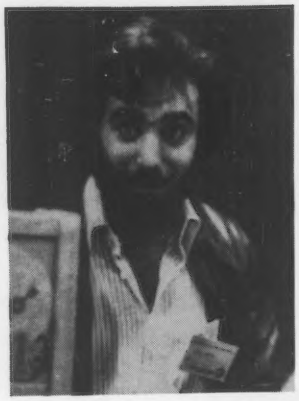
MICROCOMPUTER CONSULTANTS

P.O. Box 5279
Berkeley, California 94705
(415) 653-6707

CIRCLE 122 ON READER SERVICE CARD

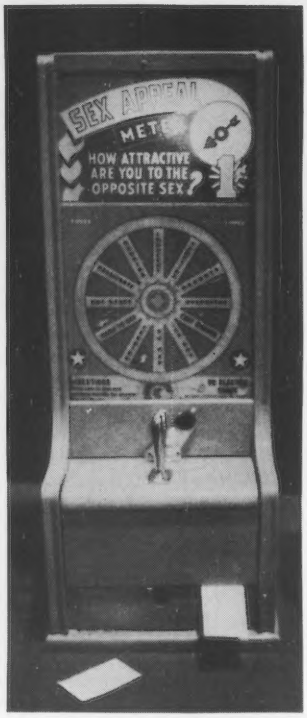
Nostalgia in Coin-op Games

David H. Ahl

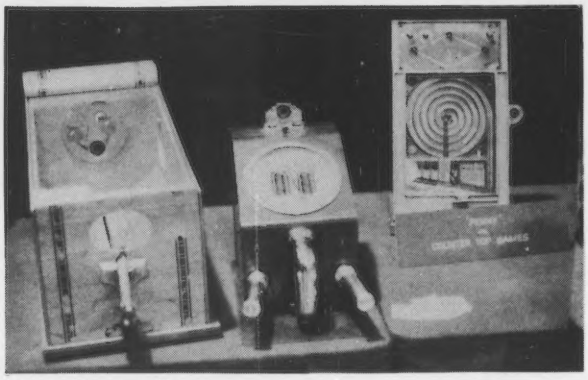


Jeffrey Chapnick, an attorney in Toronto, has one of the largest collections of antique coin-operated games and juke boxes in the world. A passionate interest in this hobby has led Jeff to form a company, The Genti Corporation, to buy, sell, and trade antique games.

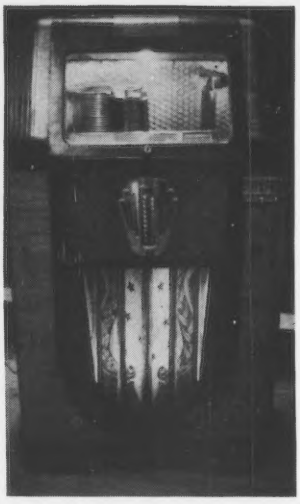
A word to the wise: antique coin-op games can cost as much as five or six complete personal computer systems. Serious collectors who want to buy or sell should contact Jeffrey Chapnick, The Genti Corporation, 25 Lois Ave., Toronto, Ontario M6B 3K4, Canada. (416) 782-1988.



Put in a penny, grip the handle and this machine will give you a card analyzing your sex appeal — "Hot Stuff, Passionate, Hard to Get" and a dozen others.



Penny Games. The game on the left shoots pennies into the mouth of a clown. The one in the center "measures" your hand strength. At the right is a game of chance played with small balls similar to Japanese Pachinko.



The playing mechanism in this juke box is a mechanical nightmare. The flip side of each record is played "upside down" by a tone arm from the bottom.

Three early floor model Juke Boxes. Each gave the user an astounding choice of 20 different tunes.

Photos by Jackie Earnshaw.

This 1936 Wurlitzer Model 61 gave the user a choice of 12 records. Each play costs a nickel.

Osborne & Associates, Inc.

The World Leaders in Microprocessor Books

Program Books Written in BASIC

Payroll with Cost Accounting	#09-8	$15.00
Accounts Payable and Accounts Receivable	#13-6	$15.00
General Ledger	#20-9	$15.00

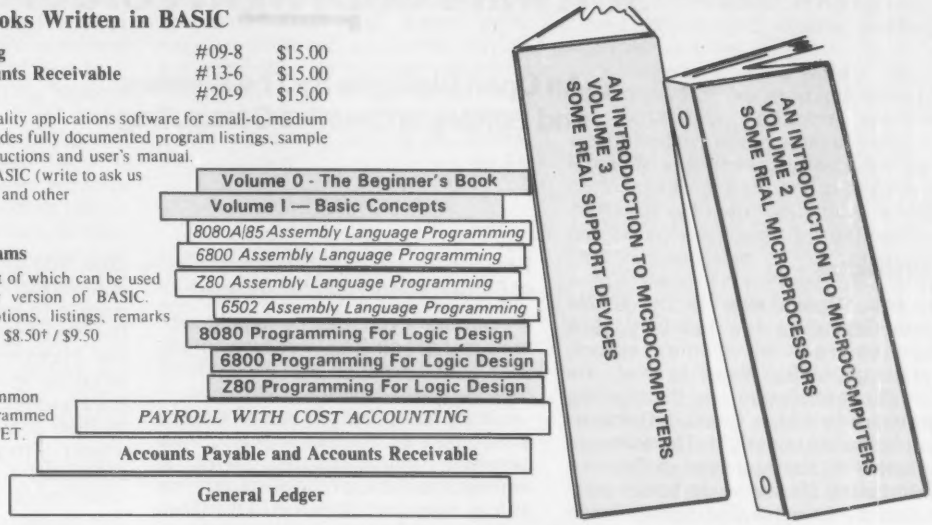
These books feature complete, quality applications software for small-to-medium sized businesses. Each book includes fully documented program listings, sample printed reports, installation instructions and user's manual. Written in an extended Wang BASIC (write to ask us about our CP/M CBASIC version and other conversions).

Some Common BASIC Programs

76 short practical programs, most of which can be used on any microcomputer with any version of BASIC. Complete with program descriptions, listings, remarks and examples. 200 pages. #06-3 $8.50† / $9.50

NEW PET Cassette

All 76 programs from Some Common BASIC Programs are now reprogrammed ready to run on the Commodore PET. Available on cassette only. The book is necessary for program documentation and user instructions. #25-X $10.00


Volume 0 - The Beginner's Book
Volume I — Basic Concepts
8080A/85 Assembly Language Programming
6800 Assembly Language Programming
Z80 Assembly Language Programming
6502 Assembly Language Programming
8080 Programming For Logic Design
6800 Programming For Logic Design
Z80 Programming For Logic Design
PAYROLL WITH COST ACCOUNTING
Accounts Payable and Accounts Receivable
General Ledger
AN INTRODUCTION TO MICROCOMPUTERS
VOLUME 3
SOME REAL SUPPORT DEVICES
AN INTRODUCTION TO MICROCOMPUTERS
VOLUME 2
SOME REAL MICROPROCESSORS

Assembly Language Programming

8080A/8085 Assembly Language Programming	#10-1	$8.50† / $9.50
6800 Assembly Language Programming	#12-8	$8.50† / $9.50
NEW **Z80 Assembly Language Programming**	#21-7	$9.50
COMING **6502 Assembly Language Programming**		

These books describe how to program a microcomputer using assembly language. They discuss classical programming techniques, and contain simplified programming examples relevant to today's microcomputer applications. 400 pages each.

Programming for Logic Design

8080 Programming for Logic Design	#04-7	$8.50† / $9.50
6800 Programming for Logic Design	#05-5	$8.50† / $9.50
Z80 Programming for Logic Design	#11-X	$8.50† / $9.50

These books describe the meeting ground of programmers and logic designers; written for both, they provide detailed examples to illustrate effective usage of microprocessors in traditional digital applications. 300 pages each.

An Introduction to Microcomputers

Volume 0 - The Beginner's Book

If you're not familiar with computers, but would like to be, then this is the book for you. Computer logic and terminology are introduced in a language the beginner can understand. Computer software, hardware and component parts are described, and simple explanations given for how they work. Text is supplemented with creative illustrations and numerous photographs. 300 pages. #08-X $7.95

Volume 1 - Basic Concepts

A must for anyone in the computer field, this best selling text explains hardware and programming concepts common to all microprocessors. Its universal appeal is reflected by its having the greatest yearly sales volume of any computer text. 350 pages. #02-2 $8.50†

Volume 2 - Some Real Microprocessors*

Provides objective, commercial-free descriptions of virtually every microprocessor on the market today. Lets you know what's available, how they work (or sometimes don't work), and how to use them. More detailed user/designer information than provided by most manufacturers.

Volume 3 - Some Real Support Devices*

Same objective, in-depth coverage as Volume 2, but applied to support devices that might be used in any microprocessor system: memory, data communication devices, data converters, direct memory access controllers, busses, and much more.

*Volume 2 and Volume 3 Updates

To cope with the rapid evolution of microprocessor products, Volumes 2 and 3 have their own series of six bimonthly updates, allowing you to remain current with all parts as soon as they are really available. Update subscriptions sold separately.

Volume 2, 1400 pgs. loose leaf #15-2	$25.00
Volume 2 binder #16-0	$ 5.00
Volume 3, 700 pgs. loose leaf #18-7	$15.00
Volume 3 binder #19-5	$ 5.00
Volume 2 update only	$25.00/yr.
Volume 3 update only	$25.00/yr.
Volume 2 and 3 updates	$40.00/yr.

†As of July 1, 1979 all $8.50 book prices increase to $9.50. If ordering after July 1, 1979 please use $9.50 price.

OSBORNE & ASSOCIATES, INC.
630 Bancroft Way, Dept. L10
Berkeley, CA 94710
(415) 548-2805
TWX 910-366-7277

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

PHONE _____

SHIPPING (Shipping for large orders to be arranged)
Vol. 2 and Vol. 3 update subscriptions:
□ $4.00 foreign air mail shipping per update subscription
□ No charge in the U.S. - 4th class mail ONLY
Books & Binders:
□ All foreign orders $4.00 per book for airmail
□ $0.45 per item 4th class in the U.S. (allow 3-4 weeks)
□ $0.75 per item UPS in the U.S. (allow 10 days)
□ $1.50 per item special rush shipment by air in the U.S.

Cassettes:
□ No additional charge in the U.S.
□ $1.50 each foreign air mail

Book/Cassette	Price	Quantity	Amount
Calif. residents add 6% sales tax. S.F. BART residents add 6-1/2 % sales tax. No tax on update subscriptions.		Subtotal	
		California residents tax	
Updates:			
		Shipping	
		TOTAL AMOUNT ENCLOSED	

Payment in advance must be enclosed for purchases of up to $70.00. Invoicing U.S. purchases over $70.00 available upon approval of your account. All foreign orders must be prepaid in U.S. dollars drawn on a U.S. bank.

Please send the following information:
□ Becoming an O&A dealer
□ School discounts
□ List of foreign distributors
□ Current catalog
□ CP/M CBASIC business programs

S1025

CIRCLE 111 ON READER SERVICE CARD

Software Copyright Forum

An Open Dialogue By The Readers and Editors of Creative Computing

Introduction

Our "Open Letter to the CP/M User Group" in the February 1979 issue sparked a fair volume of correspondence. (The issue is that the CP/M User Group is distributing software to which Creative Computing holds the copyright. The software in question has appeared in Creative Computing Magazine, in books published by Creative Computing Press or on Creative Computing Software floppy disks.) So far the mail has been running about 60% pro, 40% con. Most of the pro letters tend to be from current (or aspiring) software authors who have published a program either in a magazine or on a tape cassette and then seen their program crop up in a user group, software exchange, computer club library, or even in a release by a software publisher. They often complain that as a result of such copies, their market for tapes or disks has diminished severely. They empathize with us and frequently express the hope that we will "win" in court. At least one such software author has offered to testify in court in the event we wish to make this a class action suit.

Frankly, we do not intend to take this case to court because as Lawrence Eisenberg points out in his thoughtful letter (below), "realistically, the cost of preserving one's 'copyright' in this new field precludes any effective enforcement." The legal issues appear to be so muddy that it could well take tens of thousands of dollars in legal fees and a satisfactory resolution would still not be reached. The only people who would really benefit would be the lawyers.

We chose not to print any of the "pro" letters because most of them simply support our position as stated in our open letter. However, some of the opposing letters raise other questions which are well worth airing.

If other readers have views on the subject, we would be happy to carry on this dialogue in future issues. Let us hear from you.

David H. Ahl
Publisher

Free and Unrestricted Distribution of Software Should Be Encouraged

Although you may be **legally** correct, you are cutting your own throat with your Demands and Objections regarding the CP/M Users Group.

In the first place, when software is distributed by the users group, it is generally undocumented, with a reference to the appropriate magazine article. This is an incentive to the User to acquire that issue (possibly a back issue) of the magazine. Frequently such distributions from the same magazine serve as a significant suggestion that the magazine in question is worth subscribing to. By this logic (which seems quite reasonable to this computerist), you should **encourage** not **discourage** the inclusion of Creative Computing software in the CP/M users group, providing only that credit is given for the source of the program.

Secondly, I can't understand your motivation; at $8.00 per diskette, Tony is not making any money on the user's group (remember that includes the diskette, shipping, copying, and selecting items for inclusion plus maintaining the mailing list). What injury does this do to you? It doesn't cost you any money. It doesn't decrease your circulation. (It may increase it — it is certainly free advertising when the accompanying magazine article is referenced).

It doesn't really make the program available to hobbyists anymore who couldn't get it anyway, as most either receive or have a close friend who receives your magazine. What it does do is save us the trouble of keying in the program by hand — something which I personally am unwilling to do in all but the most extreme case.

In closing, I might finally point out that not only do most of your readers probably object to your refusal to permit Creative Computing articles to be distributed by a non-profit 3rd party organization, but also, many of your advertisers also probably would disagree with your stand. Software makes our computers — their products — more useful and desirable, and as a consequence the free and unrestricted distribution of software is to be encouraged as being in the best interests of our hobby and the micro computer industry (your industry) so long as proprietary software products which are being sold by their copyright owners are not involved. Programs which have been published in magazines in source code format certainly do not fall into that category, which leads me to conclude that your position, however legally well based it may be, is ill-advised from both your position and mine.

Barry Walryms
560 Sunset Road
Benton Harbor, MI 49022

Ah, yes, but credit was often not given in the CPMUG disks. Also, we appreciate your genuine concern, but shouldn't it be ***our*** *decision whether or not our best interests are served by donating our software to user groups? As for your final paragraph, we* ***do*** *allow nonprofit 3rd parties to reprint articles (see the letter below). Thanks for your comments. —SN*

When Does Reprinting Become Theft?

A short time ago, you sent me a carbon copy of a letter you wrote to Mr. Anthony Gold on the subject of republication of software. Your letter was the inspiration for me to explore this issue more fully, and I am polling editors of the major computer magazines to elicit their comments on this subject. It is, as I am sure you are aware, a subject of confusion and very few legal precedents.

One thing puzzles me about your letter to Mr. Gold, and that is this: each of your magazines contains a box entitled "OK to Reprint," which, when one reads it, says exactly that... it's okay to reprint your software. I would appreciate your explaining to me why you are so angered by Mr. Gold's reprinting of software contained in Creative Computing. My

own checking into the matter has revealed that Mr. Gold makes little, if any, profit from his ventures; his reputation in the field is quite clean.

I would also appreciate your letting me know your views in general on the subject of copyrighted software. When does reprinting become theft? Is it only when dollar profit comes into the matter that the reprinting of software becomes theft? A lawyer with whom I have recently spoken says that the dividing line in the courts—at least thus far—is this: "If you don't do it (reprint software) for money, then it's okay." What are your views on this?

After I receive replies from people involved in this fact-finding venture of mine, I will call you to discuss the matter further. You may also call me at any time to discuss this somewhat thorny question.

Suzanne Rodriguez, Editor
Dr. Dobb's Journal

If CPMUG is distributing programs we have published as an extension of our policy on reprints (see the notice in the front of every issue of ***Creative****) then we're* ***still*** *waiting for our free copies of the software and for notice of their origin to appear in the user group volumes. However, it seems more likely that no one even gave a second thought to any obligations concerning the source of the programs. Also, one reason we're happy to allow reprints is that they do not compete with our own products. This is not true of the CP/M User Group disks, and our free-to-reprint policy does not extend to books, either.* — *SN*

In response to Suzanne's "fact finding venture," Carl Helmers had this to say in Byte, April 1979, pg. 207.

A Software Counterpart to ASCAP?

When we publish software, it is subject to copyright, the only meaningful form of protection. Just as we would expect someone to formally ask for permission to reprint an article published in BYTE magazine, we would expect similar respect from anyone going beyond the bounds of fair use with respect to program copies taken from our products. In short, when we publish a program with copyright protection, whether as part of a book or as part of an article, we would expect anyone copying and distributing such a program to write requesting permission to do so. We are not averse to giving permissions with credit, and no publisher with a long-term view would, in my opinion, have a blanket policy against granting such permissions.

If anyone were to widely reproduce copies of our products without our permission, chances are we would find out about such use and be forced to examine the effects and our options in such a situation. There is a matter of our own reputation, which can be compromised by indiscriminate reproduction of our products even if there is no monetary gain to be had by the person or persons engaging in such unauthorized reproduction.

As for software publishing, when we buy a program for reproduction in book form, or as a simple listing plus documentation (often accompanied by machine readable code), we treat it in the same way as we treat the ideas of an author writing a conventional article or book. We are buying the embodiment of those ideas in a particular written or program form, not the ideas or concepts which constitute the program or work of writing. Because of the rampant confusion in the software area, our typical contract with authors of software explicitly states that we are buying an exclusive

Apple Software from RAINBOW NEW!

PIE TEXT EDITOR Machine language, cursor-based text editor for 16K Apple.
- Features format capabilities of most text editors.
- All commands are control characters.
- Enables you to define your own function commands.

Order PIE on cassette: $19.95. . . . . .on diskette $24.95

HIGH RESOLUTION CHARACTER GENERATOR Machine language program for 16K Apple.
- Define your own character set and graphic shapes.
- Complete English upper/lower case character set.
- Complete Greek Alphabet with upper/lower character set.
- Scroll, vary window size, invert characters, switch back and forth between two character sets.

Order on cassette $19.95. . . . . .on diskette $24.95

FORTE Music Interpreter in Machine Language for 16K Apple.
- Handles six voices.
- Single step capability.
- Full editing features.
- Trace line numbers or notes.
- Print words of any song.
- Save songs on cassette or diskette.

Order FORTE on Cassette $19.95

Call or write today for your FREE Apple Software Catalog. B/A and Mastercharge accepted. Sorry, no CODs. Add $1.25 Shipping & Handling. California residents add 6% sales tax. We ship promptly on receipt of your ppd. order. Order from:

RAINBOW COMPUTING INC.
Garden Plaza Shopping Center, Dept 6CC
9719 Reseda Blvd., Northridge, CA 91324
Telephone (213) 349-5560

MICROCOMPUTER OWNERS OF:

- ALPHA MICRO
- CBASIC (CP/M)
- MBASIC (CP/M)
- APPLE II
- TRS-80

We Offer Quality Software At Low Prices For Immediate Delivery:

PAC #		
1	Some Common Basic Programs	$15.00-$29.00
2	Alpha Micro Utilities	$25.00
3	Statistical Analysis	$30.00
4	Finance Calculator	$20.00
5	PLOT	$25.00
6	Mailing List System	$35.00
7	Deprec. & Amort.	$20.00

Each package includes one floppy disk (with source and object code), and a well documented user's manual.

Write for more information, or see your local dealer.

Pac #6 not available for Apple II or TRS-80.

BUSINESS SOFTWARE

MICRO-COMPUTER SYSTEMS CONSULTING

M/C
VISA

BASIC FORTH FORTRAN COBOL BBSC

THE BASIC BUSINESS SOFTWARE COMPANY, INC.
POST OFFICE BOX 2032
SALT LAKE CITY
UTAH 84110
(801) 363-1199

CIRCLE 112 ON READER SERVICE CARD

Forum, con't....

license to the software reproductions in book form, with the rights to license the software in other ways to manufacturers or media distributors retained by the author. The act of sale of the book or listing copy is then, in our view, totally analogous to the act of sale of such items as a phonograph recording, a book about some subject, a video recording, or other relatively conventional published work. This act of sale carries with it an implied zone of fair use reproduction possibilities, but is in no way a license to widespread reproduction whether it is done commercially or by some "non-profit" entity.

Basically, there should be a software publishing analogue of the ASCAP or BMI organizations of the music world, but the field is too young at present. There are a number of questions to be answered as history unfolds in this field but, contrary to your letter's viewpoint, there are historical precedents which can certainly be examined and applied to the new concept of computer programs as works of authorship and original composition....CH

Software Copyright Protection Does Not Exist

Who ever said that any computer programs can be copyrighted? This is the most troublesome area of computer law at this very time. By now your own attorneys have informed you of what many others have found — notwithstanding the language of the statutes, as a **practical** matter computer-program copyright protection simply does not exist — yet!

As stated by Mr. David Bender, Esq., in his excellent newly released treatise Computer Law: Evidence and Procedure (Matthew Bender - 1978), $4.05(2), p. 4-39:

> "The copyright law, which protects form, as opposed to ideas, is just as replete with issues as the patent area, but is completely devoid of cases constituting direct precedent. Despite this dearth of precedent, the copyright aspects of software protection have attacted a good deal of interest in legal publications, and the Copyright Office has announced a policy of permitting registration of programs where the copy submitted meets certain criteria.
>
> "The matter of software copyrightability raises numerous questions whose answers require resort to computer evidence. Do programs (or some of them) possess 'originality' so as to qualify for copyright? Does translation in form (e.g., from punched card to magnetic tape) constitute 'copying' (the act proscribed by copyright law)? Do internal machine manipulations constitute copying? ... Will it be easy to 'program around' a copyrighted program by making superficial changes? ..." Footnotes omitted. (P.S. The use of quotations from legal treatises is perfectly legitimate, so long as proper citation is given and the purpose is authoritative.)

Realistically, the cost of preserving one's "copyright" in this new field precludes any effective enforcement. Even one of the giants, Digital Equipment Corporation, recently chose to settle rather than litigate this expensive issue, although the issues had been presented squarely. (Rockfod Research, Inc., et al., vs. Digital Equip. Corp., et al. [Civ. 73-2965-T, U.S.D.C. Mass.]. The fact that there was a settlement cannot be considered as an admission of wrongdoing by any party, if you please!)

Lawrence H. Eisenberg
17141 Nance Street
Encino, California 91316

FASTER THAN A SPEEDING BULLET
IT'S THE NEW PASCAL MICROENGINE™ FROM P.P.S.

- PASCAL MICROENGINE™ ENCLOSED IN A STYLIZED LOW PROFILE HOUSING COMPLETE WITH POWER SUPPLY
- 64K BYTES (32K WORDS) OF RAM MEMORY
- TWO RS 232 ASYNCHRONOUS PORTS (110-19.2K BAUD)
- TWO 8 BIT PARALLEL PORTS
- FLOPPY DISK CONTROLLER WITH DIRECT MEMORY ACCESS (DMA) IS SWITCH SELECTABLE FOR
  —SINGLE OR DOUBLE DENSITY
  —MINI FLOPPY OR 8" FLOPPY
  —1 TO 4 DRIVES (SAME TYPE)
- FLOATING POINT HARDWARE
- SELF TEST MICRODIAGNOSTICS
- ASCII CONSOLE

WE CARRY A FULL LINE OF PRINTERS & TERMINALS AT VERY ATTRACTIVE PRICES, AS WELL AS COMPLETE SUB-SYSTEMS.

FUTURE EXPANSION
64K BYTES ADD ON MOS MEMORY $1595.00
5-20 MEG DRIVES W/CONTROLLER $7-9K

Send to P.P.S.
P.O. Box 2051, Seal Beach, California 90740
For fast service or information call (714) 894-3736
We Accept Mastercharge and B of A
Dealer Inquiries Invited

CIRCLE 195 ON READER SERVICE CARD

DISK TRS-80 DISK

Accounts Receivable, Accounts Payable, CPA Gen. Ledger, Gen. Payroll, Farm Payroll, Job Cost, Word Processing, Restaurant Payroll, Utility Billings, Depreciations.

IMMEDIATE DELIVERY
FULL CHAINING CAPABILITY
ALL SYSTEMS LICENSED

For sample reports send $6.00 to cover postage & handling.
Each system is priced at $240.00.
First time user cookbook documentation.
Money Order, VISA Master Charge only, Please.
Please state 2 or 3 disk systems.

	2 DISK SYSTEM	3 DISK SYSTEM
PAYROLL	125 EMPLOYEES	250 EMPLOYEES
ACCTS. PAYABLE	200 VENDORS	400 VENDORS
ACCTS. REC.	250 CUSTOMERS	500 CUSTOMERS
GEN. LEDGER	125 ACCOUNTS	250 ACCOUNTS
JOB COST	25-45 JOBS	50-130 JOBS

COMPUTER SYSTEMS DESIGN, INC.
P.O. Box 735
Yakima, WA. 98907
Call 1-509-575-0320

CIRCLE 133 ON READER SERVICE CARD

Thank you for the most rational and realistic advice we've had so far.
— SN

An Open Insult to Creativity?

My sincere appreciation to you for the many fine articles and programs in your past issues. You have done a superb job.

Your "Open Letter" to Tony Gold of the CP/M User's Group is an open insult to creativity, free enterprise, and Title 17 of the United States Code (Copyright Law). In my opinion, you should print a retraction of your letter and an apology to Tony Gold.

As I interpret your letter, it would be O.K. with you if each person, individually, typed your programs into his system, corrected the bugs, added the enhancements, and performed the conversions necessary to make them run on his system (i.e., CP/M) with his version of the language (i.e., BASIC). However, when Tony Gold forms an organization which allows the sharing of these programs, most of them corrected, enhanced, and converted (or partly so), at a reasonable price; then you feel that your rights have been violated. Because of Tony Gold, and others of his stature, thousands of people have not had to type, correct, enhance, and convert these programs; thousands of systems and components have been sold because suddenly people have had meaningful software to run on them. The entire industry, including **Creative Computing**, has benefited.

To me, your letter says that you would prefer to sell these programs on computer media yourself, at a higher price, a year later than Tony made them available, and in their original, published form (i.e., uncorrected, unenhanced, and unconverted). Much effort by many people other than the original program authors went into the significant modifications to your originally good software. I refer you to your own publication, the other magazines and hobby newsletters, and to Zoso's comments to judge the quality of these programs and to judge how significant these modifications and enhancements have been.

If you wish to continue to market disks of your original software, that is your right in our free economy. However, you should remember that had it not been for guys like Tony and other innovators of the personal computer revolution, you wouldn't have a marketplace in which to offer these disks. You have missed the boat, by at least a year, and in the case of "101 Games," by as much as 5 years. Where have you been? [Missing the boat by 5 years is not surprising since "101 BASIC Computer Games" was put together 7 years ago in 1972 and first published in July 1973. — DHA]

To me, a software pirate is one who profits by selling another author's individually copyrighted programs to others without the author's permission. Behavior of this type is not only unethical, but also opens the door for justifiable legal actions to be taken. There are very, very few true software pirates around, and Tony Gold is not one of them.

I recommend that you gents stop this quibbling, admit that you blew it, and get on with putting out your fine magazine.

Michael N. Hayes
MNH-Applied Electronics
P.O. Box 2262
Arlington, VA 22202

An insult to creativity and free enterprise? Just whose do you mean? By "using" software snatched out of other people's books and magazines, user groups are not demonstrating much creativity. I also fail to see the

APPLE II® PROFESSIONAL SOFTWARE

ASM/65 EDITOR ASSEMBLER

ASM/65 is a powerful, 2 pass disk-based assembler for the Apple II Computer System. It is a compatible subset of the FORTRAN cross-assemblers which are available for the 6500 family of micro-processors. ASM/65 features many powerful capabilities, which are under direct control of the user. The PIE Text Editor co-resides with the ASM/65 Assembler to form a comprehensive development tool for the assembler language programmer. Following are some of the features available in the ASM/65 Editor Assembler.

PIE Text Editor Command Repetoire
Disk Based System
Decimal, Hexadecimal, Octal, & Binary Constants
ASCII Literal Constants
One to Six character long symbols
Location counter addressing "*"
Addition & Substraction Operators in Expressions
High-Byte Selection Operator
Low-Byte Selection Operator
Source statements of the form: [label] [opcode] [operand] [;comment]
56 valid machine instruction mnemonics
All valid addressing modes
Equate Directive
BYTE Directive to initialize memory locations
WORD Directive to initialize 16-bit words
PAGE Directive to control source listing
SKIP Directive to control source listing
OPT Directive to set select options
LINK Directive to chain multiple text files
Comments
Source listing with object code & source statements
Sorted symbol table listing

CONFIGURATION

Apple II **48/K Disk** **$69.95**

PROGRAMMA Software Products

PROGRAMMA INTERNATIONAL, Inc.
3400 Wilshire Blvd. Los Angeles, CA 90010
(213) 384-0579 / 384-1116 / 384-1117

CIRCLE 107 ON READER SERVICE CARD

25 START-AT-HOME COMPUTER BUSINESSES

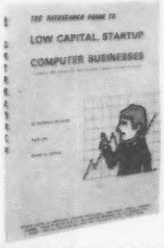
In "Low Capital, Startup Computer Businesses"

CONSULTING • PROGRAMMING • MICRO COMPUTER OPPORTUNITIES • SOFTWARE PACKAGES • FREELANCE WRITING • SEMINARS • TAPE/DISC CLEANING • FIELD SERVICE • SYSTEMS HOUSES • LEASING • SUPPLIES • PUBLISHING • HARDWARE DISTRIBUTORS • SALES AGENCIES • USED COMPUTERS • FINDER'S FEES • SCRAP COMPONENTS • *AND MORE . . .*

Plus — ideas on moonlighting, going full-time, image building, revenue building, bidding, contracts, marketing, professionalism, and more. No career tool like it. Order now — if not completely satisfied, return within 30 days for full immediate refund.

• 8½ x 11 ringbound • 156 pp. • $20.00

Phone Orders **901-761-9090**



DATASEARCH
incorporated

4954 William Arnold Road, Dept. D, Memphis, TN 38117

Rush my copy of "Low Capital Startup Computer Businesses" at $20.

NAME/COMPANY _____
ADDRESS _____
CITY/STATE/ZIP _____

☐ Check Enclosed ☐ VISA ☐ Master Charge

_____ Exp. Date _____

CIRCLE 140 ON READER SERVICE CARD

Forum, con't....

*connection with free enterprise since **we're** the enterprise (fire phasers) and user groups are non-profit, remember? Also, the current version of our CP/M disks **are** enhanced (menu-driven, formatted printing, etc.) As for "Zoso's comments" (which are reviews of the CPMUG games distributed in the CPMUG user group disks) I find it rather amusing that CPMUG would at the same time blast the quality of the games, wonder where they originated, and distribute them anyway. At least when I make critical comments, I use my **real** name.* — *SN*

Quality is a Key Factor in Protecting Software

As you are probably aware, I'm establishing a micro-computer resource center as part of the Putnam/Northern Westchester BOCES Computer Services. One aspect of that center is the acquisition (via purchase, modification, translation and original work), evaluation, documentation and distribution of software. Our software acquisition has, therefore, included purchasing PET and TRS-80 programs from a large number of advertisers in **Creative Computing** and other related publications. We have, for example, purchased 7 cassettes for the PET from Creative. To date, Creative's software is the **ONLY** material we've received that has been completely error free. In every other case, some of the programs were shipped with bugs that would prevent their use in schools without modification.

There's an important reason for telling you this beside the obvious compliment to **Creative Computing**. There is justifiably a great deal of concern regarding copyright protection of many micro-computer programs. My original projections for our resource center assumed that we would document much of the purchased software. We would then distribute the documentation to local school districts, but they would have to purchase much of the software as we could not violate copyrights by providing copies. However, when the purchased material does not run and we must spend considerable time debugging the programs, correcting spelling errors, and adding features to make the programs useful in an educational environment, the result is certainly a significantly different program that can be distributed to local school districts without violating the copyright protections of the purchased material. Clearly, the many authors of micro-computer programs would be well advised to consider quality as a key factor in their own formula for protecting their software. If a purchased software product is to be used without substantial modification, I believe other educational agencies will operate as we do and not violate copyright protections.

Walter Koetke
Computer Services Director
Board of Cooperative
Educational Services
Yorktown Heights, NY 10598

When computer software is modified by someone other than the original author, does the originator lose his rights to the software? Perhaps the rights should be shared, though this raises more questions than it answers. — *SN*

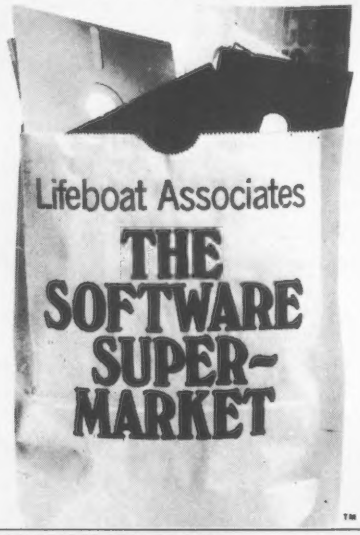
Pragmatism and Ethics

I feel somewhat foolish about this whole controversy because it's a complete waste of time. The crux of the arguments against our ownership of software published in our books and magazine is that once software is in printed form, it is in the public domain. Pragmatically, this is true. There is no way of controlling what happens to your software once other people have it. The only sure fire pro-

It's in the bag.

What is?
The biggest and best selection of microcomputer software anywhere. And the list grows bigger every day. CP/M configured for the most popular 8080/Z-80 microcomputer systems and other terrific software, now available. Call or write for our latest literature.

Lifeboat Associates, Suite 506, 2248 Broadway
New York, N.Y. 10024/(212) 580-0082



CIRCLE 160 ON READER SERVICE CARD

TRS-80

MEMORY EXPANSION KITS $79

Each Kit consists of: 8 Memory Chips, Jumper Blocks, and Complete EASY TO FOLLOW Instructions
Expands 4K TRS-80 up to 48K (3 sets)
TRS-80FLOPPY Disk (SA-400) Add On
COMPLETE Ready to use with power supply and case $389

ADD to your APPLE or $100 Bus Computer
$89 – Set of 8 250 NS
$99 – Set of 8 200 NS

No. 4116 – 200 NS (w/16K Chips), 16K, $279, 32K, $375, 48K, $469, 64K, 568

No. 4115, 8K, $189, 16K, $229, 24K, $269, 32K, $309

$100 Bus Expandoram Kits*

*Expand NOW or LATER to 64K (32K for *K Chips)
8K Chips: $49/Set of 8
ASSEMBLED, TESTED AND BURNED IN – ADD $50
MONEY BACK GUARANTEE
FULLY WARRANTED FOR 6 MONTHS
Master Charge – VISA – C.O.D. (25% with order) –
Money Order – California Residents add 6% Sales Tax
Shipping Charges: $2.00

MicroComputerWorld

P.O. Box 242 San Dimas, CA 91773
(213) 286-2661

CIRCLE 164 ON READER SERVICE CARD

tection of your work is to hide it under a rock (or sell it as object code with your name embedded in the code and in printouts, which makes the theft very obvious).

Ethics are something separate. We almost invariably pay for the software we publish which implies that we have some rights to it. I'm sure most of the people who wrote to us in favor of CPMUG would be angry and distressed if the shoe was on the other foot, i.e., if they submitted software to us and we published it without payment, because "computer software doesn't come under the copyright laws." Many software authors we publish specifically retain the right to machine readable versions of their work.

It is clearly seen that this comes down to a controversy between the creators and the users. I don't think anyone who has written any significant software came out in favor of user groups arbitrarily absorbing any published software. Ultimately, the issue will be decided in favor of the profit-making organizations, because the non-profit ones just can't meet the same standards. As pointed out, our two BASIC Games Disks retail for less than the cost of equivalent CPMUG disks, which are undocumented and unsupported. As another example, Mr. Gold himself probably puts much more effort and enthusiasm into Lifeboat Associates, his own business which sells CP/M systems and applications software, than into CPMUG these days. Even small software houses who steal from others (and there are some) only prove that they lack the ideas and resources to do it all on their own.

As for solutions, we are certainly not out to hinder non-profit user groups and would like to help them, but not at our own expense. If a user group wishes to distribute our software, we'll try to work out an inexpensive royalty arrangement (less than we pay our own program authors) but it's always nice to be asked and not forced. It has also been suggested that CPMUG be organized as two sections: commercial and non-commercial, wherein the commercial library software would be available for any use and non-commercial would be restricted. This seems better, though it still doesn't recognize our rights to our own published software.

To reiterate, my opinion is still that this is a waste of time, because nothing's going to change significantly until the industry matures (5 years, 25 years, 100 years?) Nevertheless, at least more people are now concious of the issues.

Steve North
Software Editor

A Related Case

Here's an interesting, and painful to us, related case. Price/Stern/Sloan Publishers, Inc. are the publishers of Roger Price's books of Madlibs. Henry Gallo, a high school student worked a couple of these madlibs into a computer program which we published in Creative Computing and in the first printing of Basic Computer Games (it hasn't been in from the second printing on).

Price/Stern/Sloan now are suing us for 1% of the gross sales of the book. (1% of the profit might be reasonable, but 1% of sales! If we paid each of the 101 contributors 1% of sales, we'd be paying 101% of our sales in royalties!) However, the case does illustrate an important point and that is that the orginator of a published and copyrighted piece of work has certain enforceable rights under the copyright statutes.

This seems to apply and have been reaffirmed in the courts for books, games, music and visual recordings. Perhaps the computer field is just too young, but I believe that eventually there should exist some form of legal protection for software so that we don't all have to devise hardware locks or rompacks. — DHA

• PET 2001 • PET 2001 • PET 2001 • PET 2001 • PET 2001 • PET 2001 • PET 2001

Programmer's Guides for the PET™

TIS

WORKBOOKS FOR THE COMMODORE PET 2001

Getting Started with Your PET WB-1 $4.00
Covers the fundamentals of PET BASIC: calculator and program mode, data input and output, data representation, program storage on the cassette.

PET String and Array Handling WB-2 $3.95
Covers string and substring search, concatenation, replacement and manipulation.

PET Graphics WB-3 $4.95
Covers use of cursor control and special graphics symbols to draw plots, histograms, and sketches.

PET Cassette I/O WB-4 $4.95
Covers OPEN, CLOSE, string and numeric data files.

Miscellaneous PET Features WB-5 $3.95
Covers the clock, random number generator, upper and lowercase alphabetic characters, saving memory space, etc.

PET Control and Logic WB-6 $3.95
Covers IF, GOSUB, logical operations, and ON X.

Add $1.50 for shipping and handling.

Dealer Inquiries Invited

TIS
P.O. Box 921
Los Alamos, NM 87544

Money back guarantee

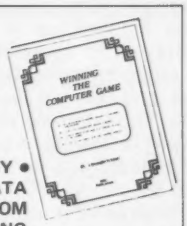
We also sell PET Software. Write for details.

PET is a trademark of Commodore Business Machines

• PET 2001 • PET 2001 • PET 2001 • PET 2001 • PET 2001 • PET 2001 • PET 2001

CIRCLE 185 ON READER SERVICE CARD

HOW TO BUY A BUSINESS COMPUTER



WHEN TO BUY • WHEN NOT TO BUY • HOW TO CHOOSE CONSULTANTS • DATA GATHERING • PACKAGED VS CUSTOM SOFTWARE • CONTRACTS • FINANCING • WARRANTEES AND MAINTENANCE • INSTALLATION MANAGEMENT AND MUCH MORE . . . . .

"SUPER BOOK!" DP Consultant, Mercer Island, Washington.

"I wish I'd had this book before I bought my computer!" TV Station General Manager, California.

"It's the best book I've seen on the subject. Send me 5 copies to send to my clients." CPA, Orange County, California.

"I really learned something from this book and I'm in the business. I'm recommending it to my clients." DP Consultant, Alhambra, California.

Here's a straight forward approach to business computer purchase and installation. It will save you time and money.

ORDER NOW! If not completely satisfied, return within 30 days for a full and immediate refund.

8½ x 11 Softbound ■ 178 pp. ■ $12.95
Credit Card Orders 1-805-964-7448

DDC PUBLICATIONS c
5386 Hollister Ave., Santa Barbara, CA 93111

Rush____ copies of "Winning The Computer Game" at $12.95 per copy. (CA residents add 6% sales tax)

NAME _____
ADDRESS _____
CITY/STATE/ZIP _____

☐Check ☐MasterCharge ☐Visa

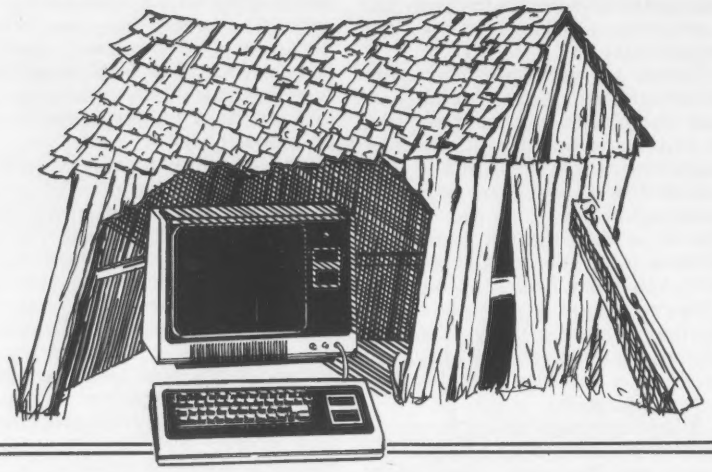
Card No. _____ Exp. Date _____

CIRCLE 141 ON READER SERVICE CARD

TRS-80 Strings

Stephen B. Gray

*For the seventh TRS-80 column, we'll look at an automatic dual-cassette interface, the bimonthly **80-US Journal**, the game of Android Nim, and a couple of short programs that mix waveforms and print backwards.*



Sel-Tronics Cassette Interface

Several companies offer dual-cassette interfaces so you can connect two cassette recorders to your TRS-80 and read from either one or write onto either or both, by using switches to control the data path.

The only **automatic** dual-cassette interface on the market at this moment seems to be the Sel-Tronics unit. The interface is a small box measuring 2 x 3 x 4 inches, or just a little bigger than a TRS-80 power supply, with connectors and cables for plugging it into the keyboard's DIN jack, and two recorders into the interface. The interface works with either Level-I or Level-II machines, and no modifications are made to the TRS-80.

Whereas the other interfaces are passive devices, the Sel-Tronics unit has half a dozen ICs in the small case. No new BASIC or program commands are needed. The interface monitors the data output line, and if data is there, the interface automatically turns on the "write" recorder. If no data, the "read" recorder is turned on.

Sel-Tronics also offers a bank-statement verification program that "makes extensive use of the dual-cassette function," and which automates the process by turning the cassette units on and off in a way that seems downright magical if you're used to flipping switches all the time.

The verification program has some sample data so you can see how the automatic operation works. Later you can skip the sample program and write in your own data, for verifying your own bank statements. The program suggests you make a tape for each month, 12 for the year. "Each month, when your statement arrives, you will use two tapes. One will contain data from the previous month. One will be blank, and data for the current month will automatically have the main program inserted ahead of the data to minimize tape handling. The data on each tape consists of checks written and deposits made that have not appeared on the statement... The program asks for information from the statement and compares it with its own computations and data from the previous month's tape. It displays a summary for you to verify your checkbook balance calculations by, and indicates discrepancies, if any, with the bank statement."

The program asks you to enter today's date, number of next check to be written, deposits, cancelled checks by number and amount, deposit checks, service charges, and balance on statement.

Then, automatically, the read recorder inputs information to the computer and stops. The computer outputs data to the write recorder, and this goes on, back and forth, one recorder turning on and off, then the other, without your having to do a thing, until the screen shows the summary. Just like one of the bigger computers, and very handy for fast and easy file-updating.

The interface has pushbuttons rather than the toggle switches most passive units have. The official reason, according to a source at Sel-Tronics, is "so you don't have to toggle back and forth to get to the right place on the tape." A very good reason, but actually they happened to have on hand pushbuttons that matched the colors of the red and green LEDs that glow to indicate which recorder is activated.

One simple internal adjustment is necessary. You open the box and adjust a trimpot so that a yellow data-monitor LED just turns on when data from the read recorder is present on the tape "at the proper amplitude for the computer." A jack is provided for earphone or scope monitoring.

The automatic dual-cassette interface unit, "all solid-state, no relays to hang up, recorders optically isolated," comes completely assembled with power supply and cables, at $69.95 plus $2 shipping, from Sel-Tronics, Inc., 721 Ellsworth Drive, Silver Springs, MD 20910. From them you can also get the bank statement verification program, which operates in 4K, for $9.95. Order BANK PROGRAM and specify Level-I or Level-II BASIC.

The Sel-Tronics automatic dual-cassette interface has both red and green LEDs behind the lens that's between the two pushbuttons; the red lights for a write operation, the green for read. The other LED glows yellow when data is on the tape.

80-US Journal

First published last fall as **80-NW** and subtitled "A Journal for TRS-80 Users," this magazine is now called **80-US** and is subtitled "The TRS-80 Users Journal," to reflect a transcon-

tinental readership rather than a regional one.

A subscription to **80-US** is $16 a year for six issues, from 80-NW Publishing, 3110 North 31 St., Tacoma, WA 98407. A sample copy of the current issue is $3.

By the fourth issue, **80-US** grew from 16 to 48 pages. It's full of information and help to TRS-80 users, including game, business and educational programs, tutorials on what makes a TRS-80 tick, hardware mods, news items about hardware and software, and fascinating articles such as a recent one on photographing TRS-80 graphics with shading, showing a photo of a TRS-80 graphics-block approximation of a sphere lighted from the above left. The areas to be brightest are displayed longest.

Most of the programs in each issue are available on Level-II cassette or disk. **US-80** also offers other programs, such as Android Nim, a Level-II 16K animated-graphics program with sound, at $14.95. Anybody interested in creating animated graphics on the TRS-80 should take a look at Android Nim, written by Leo Christopherson.

When you run Android Nim, you get several pages of introduction, then three clever androids, each about two inches high, in a column at the left of the screen. They move their heads and arms, and blink their eyes, as you make up your mind whether to let the computer make the first move, or to make it yourself. The heads have seven positions, and the arms have three.

When you decide who moves first, more androids appear on the screen: seven in the top row, five in the middle, three in the bottom row.

On your move, you designate how many androids are to be "removed" from a particular row. The android executioner at the far left of the screen looks to his right to see the number you've entered, looks to his left at the row of androids, looks back at you, nods, then looks back at the row of androids, all of whom then stop gaping all over the place and turn their heads toward the executioner. He lifts his ray gun, and zaps the number of androids called for.

Clever touch: if you choose to remove more androids than there actually are in a row, the executioner will shake his head.

The sound version of Android Nim can be played through an AM radio placed near the keyboard, although it's recommended that you "Use the Realistic 200mw speaker-amplifier Cat #277-1008 or equiv." The computer signals your turn with a warbling tone, and just before the androids are zapped, a rising tone indicates the ray gun is charging up. The gun fires with a sound like a machine gun or a loud typewriter, and the androids disappear. When you win, the computer calls you names in print, and underlines the words with various disgruntled sounds. When the computer wins, it makes a series of rising "victory" tones.

This is a much more detailed description than usually given here, but Android Nim is an outstanding example of what can be done. You have to play the game several times to catch all the action.

Android Nim was sent to me with a note that I had said, in the Nov/Dec 1978 **Creative**, that not enough imaginative use is made of TRS-80 graphics capabilities, adding "We

RADIO SHACK COMPUTER OWNERS

TRS·80™ MONTHLY NEWSLETTER

24 HOUR ORDER LINE (914) 425-1535

master charge VISA

- PRACTICAL APPLICATIONS
- BUSINESS
- GAMBLING • GAMES
- EDUCATION
- PERSONAL FINANCE
- BEGINNER'S CORNER
- NEW PRODUCTS
- SOFTWARE EXCHANGE
- MARKET PLACE
- QUESTIONS AND ANSWERS
- PROGRAM PRINTOUTS

. . . .AND MORE

FREE WORD PROCESSING PROGRAM
(Cassette or Disk)
For Writing Letters, Text, Mailing Lists, Files, Etc.
With Each New Subscriptions or Renewal

COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™
Box 149 New City, New York 10956

ONE YEAR SUBSCRIPTION $24 _____
TWO YEAR SUBSCRIPTION $48 _____
SAMPLE OF LATEST ISSUE $4 _____
START MY SUBSCRIPTION WITH ISSUE _____
(#1 - July 1978 • #7 - January 1979)
NEW SUBSCRIPTION _____ RENEWAL _____
CREDIT CARD NUMBER _____ EXP. DATE _____
SIGNATURE _____
NAME _____
ADDRESS _____

Send for **FREE** Software Catalogue (Including listings of hundreds of TRS-80 programs available on cassette and diskette)

CIRCLE 136 ON READER SERVICE CARD

TRS-80 Strings, con't....

invite you to take a look at Android Nim which is enclosed." It is indeed a real winner, and we look forward to more highly imaginative graphics from **80-US** and Leo Christopherson.

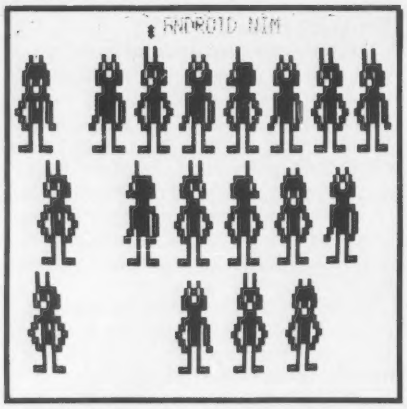
80-US Software also offers Life, at 100 generations a minute, and a version of 21 called Snake Egg, both with sound, both by Leo C., at $14.95 each. The original Android Nim, without sound and with less animation, may still be available, at $8.00.

Short Programs #1 and #2.

Here's most of a letter that arrived without a name attached. The programs have been changed only slightly. If the writer will let us know who he is, we'll give him credit for two clever Level-II programs:

"The first prints some sinewaves mixed together, the shape of the final waveform depending upon the values you enter. This program could easily be modified for a system with a printer.

```
100 INPUT D,E,F
110 CLS
120 PRINT D;E;F
130 FOR X=0 TO 127
140 A=SIN(X/D)*5
150 B=SIN(X/E)*5
160 C=SIN(X/F)*5
170 SET(X,A+B+C+23)
180 NEXT X
190 GOTO 100
```



Here is the complete cast of animated mannikins in Android Nim. They never stop moving.

"The second one starts out normally enough, asking the person for his name. When he tries to type it in, to his surprise, it is displayed backwards.

```
100 X=15999
110 CLS
120 PRINT "WHAT IS YOUR NAME?"
130 A$=INKEY$
140 IF A$="" THEN 130
150 POKE X,ASC(A$)
160 X=X-1
170 GOTO 130
```

"If you want a cursor, just insert

```
145 POKE X-1,143
```

That will make the cursor a white block. If you want a _ for a cursor, change the 143 to 95."

The first program works best with degree values of less than 10; try 2,3,4. Beyond 10, you usually don't get a full cycle. To let this program show you what it can do, all by itself and continuously, replace line 100 with

```
100 D=RND(10)
103 E=RND(10)
106 F=RND(10)
```

and move back from the screen at least six feet.

The "backprinting" routine is a great one to slip quietly into any program (a friend's, perhaps?) that asks for the user's name, or for any alphabetical information of more than a few letters. An X of 15900 might be better in line 100, to start at mid-screen. □

Enthusiasm is the most important single factor toward making a person creative.—Robert E. Mueller

SMALL SOFTWARE SYSTEM TRS-80 PRODUCTS SMALL SOFTWARE SYSTEM

RSM-1S: A MACHINE LANGUAGE MONITOR FOR 4K TRS-80'S - $23.95
RSM-2: AN ADVANCED MONITOR FOR 16K TRS-80'S - 26.95
RSM-2D: THREE MONITORS FOR TRS-80 DISK SYSTEMS - 29.95

RSM monitors all have 22 commands to control your TRS-80 Z-80 processor. Examine your ROM's, test RAM, enter and execute machine language programs, read and write machine language tapes, and much more! A SYMBOLIC DUMP command disassembles memory into Z-80 mnemonics! Memory may be displayed in HEX or two ASCII formats, and can be EDITED, MOVED, EXCHANGED, VERIFIED, FILLED, ZEROED, TESTED, or SEARCHED for one or two-byte codes!

RSM-2/2D include all above features, plus read and write SYSTEM tapes, enter BREAKPOINTS, PRINT with our TRS232 or the expansion interface, and read and write disk sectors directly! RSM-2 loads at the top of 16K LEVEL I or II. RSM-2D, furnished on disk, has 3 versions for 16K, 32K and 48K.

BASIC-1P - LEVEL-1 BASIC WITH PRINTING! - $15.95

Loads into the top 4K of 16K TRS-80's and uses any LEVEL-1 BASIC program or DATA tape (up to 12K in length) without conversion! Plus LLIST and LPRINT for TRS232, RS-232-C or Centronics printers. LPRINT ON and LPRINT OFF prints anything that you see on the screen! All LEVEL-I abbreviations and functions supported.

BARRICADE: MACHINE LANGUAGE ACTION GAME FOR TRS-80'S - $14.95

Break through the 5-wall Barricade with the high-speed ball and keyboard controlled paddle! Trap the ball among the walls and watch it destroy the 100 blocks! Select from 8 speeds, 4 paddle sizes, and 3 ball-angle limits to challenge experts and beginners. 3 scores with the best of each saved to be challenged by other players. NOBODY can achieve the maximum WEIGHTED SCORE of 33,000! 4K LEVEL-I and II.

AIR RAID: A REAL-TIME TRS-80 SHOOTING GALLERY! - $14.95

A high speed machine language game where large and small airplanes fly across the screen at different altitudes. A ground based missile launcher is pointed and fired from the keyboard. Aircraft explode dramatically when hit, sometimes destroying other nearby planes! Score is tallied for each hit or miss, and the highest score is saved to be challenged by other players. AIR RAID provides hours of fun for you, and is a super demonstration program for entertaining friends! 4K LEVEL I and II.

* CALIFORNIA RESIDENTS ADD 6 PER CENT SALES TAX *

* SMALL SYSTEM SOFTWARE * P.O. BOX 366 * NEWBURY PARK, CALIF. 91320 *

THE ELECTRIC PENCIL FOR TRS-80 DISK SYSTEMS - $150.00
THE ELECTRIC PENCIL FOR TRS-80 TAPE SYSTEMS - 99.95

Write text, delete, insert, or move words, lines or paragraphs, save your text on tape (or disk), then print formatted copy with our TRS232 or the Radio Shack Printer (plus RS-232-C with disk version). Right justification, page titling and numbering, transparent cursor and repeating keyboard. Uppercase only, or add lowercase entry and display with minor modification. Tape version runs in LEVEL-I or II 16K computers. A superior word processor for home or business use!

CP/M OPERATING SYSTEM WITH TRS232 DRIVER - $145.00

CP/M is a file-oriented disk operating system that provides a common set of utilities for program development and operation. 6 built-in commands, plus many utilities called in from disk. A single editor (ED) is used to create and modify all files. Files may be much longer than your memory! The assembler (ASM) assembles files directly from disk, placing HEX object and assembled PRINT files back onto disk! Also includes DDT (Dynamic Debugging Tool), PIP (Peripheral Interchange Program), and more! CP/M will run on 16K TRS-80's with single disk drives, but 32K and 2 or more drives are recommended. CP/M is a trademark of Digital Research, Inc.

DCV-1: CONVERT SYSTEM PROGRAMS TO DISK FILES - $9.95

RSM monitors, Barricade, Air Raid, RSL-1, ESP-1, T-BUG, or nearly any SYSTEM tape shorter than 5K (21K if you have 32K of memory) can now be executed from disk, even if it interferes with TRSDOS! DCV-1 loads system tapes into high memory and adds a block-move routine. TAPEDISK is then used to create a disk file. When accessed from disk, the program loads into high memory, moves itself to its correct address, then jumps there and executes!

TRS232 PRINTER INTERFACE - $49.95 (+$2.00 shipping)

A fully assembled self-contained software-driven output port for TRS-80 printing. Use any RS-232 or 20-mil current loop ASCII printer. The TRS232 is furnished with cassette software and works either with or without the expansion interface! Use the TRS232 with LEVEL-II BASIC, CP/M, BASIC-1P, ELECTRIC PENCIL, RSM-2/2D or your own programs!

OTHER TRS-80 PRODUCTS

ESP-1: $29.95 Editor, assembler, and monitor using INTEL 8080 mnemonics.
RSL-1: 14.95 Draw patterns, then play Conway's LIFE in machine language.
LST-1: 8.00 A disassembled listing of LEVEL-1 BASIC with some comments.

* SMALL SYSTEM SOFTWARE * P.O. BOX 366 * NEWBURY PARK, CALIF. 91320 *

TRS-80 SOLUTIONS!

L I = Level I L II = Level II D = Disk ALL THIS AND MORE!!!

BUSINESS

Appointment Log by M. Kelleher Perfect for the professional. Accepts name and address, meeting start and endings, subject matter, derives elapsed time. For Level II, 16K $9.95

Payroll by Stephen Hebbler Comprehensive 24 pg. manual with step-by-step instructions included in the package. Supports W2 and 941 information. D. $59.95

Mail List I by Michael Kelleher is the economy model of disk-based mailing list programs. Uses a single drive and handles up to 1400 names per disk, plus provisions for sorting options. - 16K, D $19.95

BIZ-80

The Business Software People®

Just about everything you need ... within 1 year, participants receive programming for Inventory, Accounts Receivable, Accounts Payable and General Ledger systems, plus Sales and Payroll. Complete documentation and software on diskette, $200.00

Mail List II by BIZ-80 Complete mail list system for dual disk. Enter, update, merge, sort, and print mailing labels. D, 32K $99.95

Small Business Bookkeeping by Roger W. Robitaille, is based on the Dome Bookkeeping Journal, sold for years in stationery and discount outlets. Level II, 4K with ($22.00) or without ($15.00) Dome journal.

Inventory System II by BIZ-80 Proper inventory management is the backbone of a profitable business, yet it's very difficult to keep current on price increases, shrinkage, low-on-stock items, profitable items versus losers, without an efficient and prompt method of surveying your inventory levels at any given time. This program can help you to achieve optimal management — it can handle up to 1,000 items on one disk; each additional disk can handle another 1,000 items. With Documentation, $150.00

Inventory S by Roger W. Robitaille, Sr. 240 stock items can be contained using the full 6 data areas and 2 pieces of alpha information. Level I or II,16K $25.00

Inventory II.2 Disk based program allows for creation, maintenance and review of over 2,000 items per clean diskette. Operates under Disk BASIC,DOS 2.1 with minimum memory allocation. D, $59.95

ST 80 - SMART TERMINAL

Lance Micklus

Turns your TRS-80 into a computer terminal. Features include CONTROL key, REPEAT key, ESC key, RUN key and a functioning BREAK key. Lets you list incoming data on line printer. Reprogram RS-232-C switches from keyboard, making baud rate changes simple. Level II, 16K $49.94

Text-80 by Frank Rowlett Fully-documented text processing system for disk. Create, edit, move, delete, insert, change, print words or lines. D, 32K $59.95

KVP Extender by Lance Micklus Corrects keyboard bounce, upper case lock, permits use as a terminal, screen printing. On tape ($24.95) or disk ($29.95)

8080-Z80 Conversion by M. Kelleher Permits you to enter 8080 codings and returns the Z80 equivalent. L II, 16K $15.00

Basic Statistics by Steve Reisser Pearson product-movement correlation coefficient, chi-square, Fisher T-test, sample analysis of variance, Z-scores and standard scores, with a random number generator built in to simulate data. L II, 16K $20.00

Renumber by Lance Micklus Complete user control over which lines are renumbered, and how, including all GOSUB's and GOTO's. Specify 4, 16, 32, or 48 K version when ordering. **Operates in Disk mode.** L II, 4 through 48K, $15.00 **Source Listing**, $20.00 **All 4 versions on disk**, $25.00

NEWDOS

Apparat

DISK ERROR SOLVED! Stop blaming your drive, fix your DOS with NEWDOS: an enhanced disk-operating system capable of correcting over 70 errors in TRSDOS 2.1 to improve reliability, end key bounce, enable DOS commands to be called from BASIC and much more! Available NOW for 16K systems with a minimum of 1 disk drive. $49.95

ACTION GAMES

Slalom by Denslo Hamlin Choose between Slalom, Giant Slalom and Downhill. Level II, 16K $7.95

X-Wing Fighter by Rev. George Blank Put yourself into the cockpit of this fighter. Extensive use of INKEY function puts all ship controls at your fingertips without hitting ENTER key. Long range sensors warn of approaching aircraft prior to visual contact. Level II, 16K $7.95

Air Raid by Small System Software High speed machine language program with large and small aircraft flying at different altitudes. Ground-based missile launcher aimed and fired from keyboard. Planes explode when hit, cause damage to nearby aircraft. Score tallied for hits or misses. Level I or II, 4K $14.95

Batter Up by David Bohlke Level II, 16K $5.95

Ten Pin by Frank Rowlette A game of coordination, the scoring is true to the rules of the sport. Level II, 16K $7.95

ADVENTURES

Scott Adams

Feel as if you're manipulating HAL from 2001 when you play these games. Hardly any rules, finding out is part of the fun. Two adventures on 32K disk, $24.95 Tape, one adventure on each tape - pirate or land - Level II, 16K $14.95

DOG STAR ADVENTURE

Lance Micklus

You're trapped aboard an enemy battlestar ... can you find the gold, rescue the princess, discover the plans and safely escape? Level II, 16K $9.95

Amazin' Mazes by Robert Wallace Ever-changing maze situation Level II, 16K $7.95

Sink 'UM by Rev. George Blank L II, 4K $4.95

Breakaway by Lance Micklus Level I or II, 4K $4.95

Treasure Hunt by Lance Micklus Explore caves in search of twenty hidden treasures. L I or II, 16K $7.95

Kamikaze by Russell Starkey Command your ship against attacking suicide planes. Machine language graphics make this fast and fun! L II, 16K $7.95

MISCELLANEOUS

Diskettes Dysan 104/1 Box of five, $24.95 + $1.00 shipping Verbatim, box of ten, $34.95 + $1.00 shipping/handling

Z80 Instruction Handbook by Scelbi Publ. $4.95

The BASIC Handbook by Dr. David A. Lien $14.95 + $1.00 shipping/handling

SIMULATIONS

3-D Tic Tac Toe by Scott Adams Three skill levels — author warns you to practice before tackling computer's third skill level. L I or II; 16K $7.95

Star Trek III.3 by Lance Micklus One of the most advanced Star Trek games ever written. Level II, 16K $14.95

End Zone by Roger W. Robitaille, Sr. Authentic football simulation, right down to the 2-minute warning. Level I or II, 16K $7.95

Cribbage by Roger W. Robitaille, Sr. You versus the computer cribbage played by standard rules. Level I or II, 16K $7.95

Bridge Challenger by George Duisman You and the dummy play 4-person contract bridge against the computer. Level II, 16K $14.95

'Round the Horn by Rev. George Blank You're the captain of a clipper ship racing from New York to San Francisco. Level II, 16K $9.95

Concentration by Lance Micklus One of the most popular television games L I or II, 16K $7.95

Safari by David Bohlke You're in the running for a film contract at a major Hollywood studio. To qualify, you must photograph the most wild animals in their natural habitat. Level II, 16K $7.95

Pork Barrel by Rev. George Blank Places you in the shoes of an aspiring Congressman. L II, 16K $9.95

Backgammon by Scott Adams Level II, 16K $7.95

Chess Companion by M. Kelleher Combines chess clock features with ability to record your moves while action is fast and furious. Level II, 16K $7.95

Sargon Chess by Dan & Kathe Spracklen Winner of the 1978 San Jose Microcomputer Chess Tournament Level II, 16K $19.95

Mastermind II.2 by Lance Micklus Lets you and the computer take turns making and breaking codes. Level II, 16K $7.95

PERSONAL

RPN Calculator by Russell Starkey A self-documenting calculator program. Uses Reverse Polish Notation with 4-level stack, 100 memories, scientific functions Level II, 16K $9.95

Home Financial Management by M. Kelleher Turns your computer into a personal financial advisor. Level II, 16K $9.95

Tarot by Frank B. Rowlett, Jr. Probably the best future-gazing type program ever written.Try it — you'll like it! Level I or II, 16K $9.95

Ham Radio by M. Kelleher Amateur frequency Allocations, ID Timer, Q-signal File, Amateur Log Routine, Propagation forecasting. L II, 16K $9.95 **Special Disk-enhanced version, 32K $24.95**

Educator Assistant by Steve Reisser Five programs of value to educators. Compute percentage, individual student averages, class averages, standard test scores, final grades. L II, 16K $9.95 D, $14.95

Electronic Assistant by John Adamson A group of 8 subprograms designed to solve problems such as tuned circuits and active and passive filters. L II, 16K $9.95

Personal Finance by Lance Micklus 33 different budgets can be easily adapted by user to fit his individual needs. A 2-part program, entry and search. Level II, 16K $9.95

Advance Personal Finance by Lance Micklus Same as above with advanced analysis routine. **Supports Disk Files** D, 32K $19.95

SOFTSIDE Your BASIC software magazine
Regular 1 year subscription - 12 issues - $15.00

PROG/80 For the serious programmer, from beginner to professional 1 year regular subscription - 4 issues - $10.00

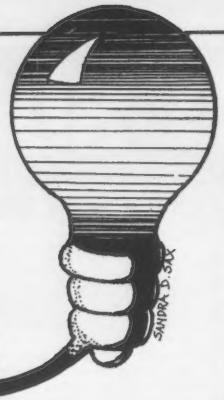
TSE 1·603·673·5144

TRS-80 Software Exchange

17 Briar Cliff Drive Milford, New Hampshire 03055

CIRCLE 186 ON READER SERVICE CARD

Compleat Computer Catalogue



We welcome entries from readers for the "Compleat Computer Catalogue" on any item related, even distantly, to computers. Please include the name of the item, a brief evaluative description, price, and complete source data. If it is an item you obtained over one year ago, please check with the source to make sure it is still available at the quoted price.

Send contributions to "The Compleat Computer Catalogue," *Creative Computing*, P.O. Box 789-M, Morristown, NJ 07960.

COMPUTERS

BUSINESS COMPUTER WITH BUBBLE MEMORY

A new line of general purpose microcomputers, combining the power of a central computer with the small size and portability of a terminal, has been introduced by Findex, Inc. The features include a BASIC-language operating system Bubble Memory mass storage; upper- and lower-case, alphanumeric plasma display; and integral printer, in one compact, portable unit weighing less than 20 pounds.

The major model, System #128, incorporates 128K bytes magnetic Bubble Memory for mass storage. The Bubble Memory can be expanded in increments of 128K. This state-of-the-art data storage technique offers high capacity in a small, stationary, light-weight package. $5000.

Findex, Inc., 1625 W. Olympic Blvd., #707, Los Angeles, CA 90015.

CIRCLE 205 ON READER SERVICE CARD

TWO MICRONOVA COMPUTER FAMILIES

Two microNOVA computer families have been announced by Data General Corporation. The two compatible microcomputer families offer improved functionality, more compact and reliable packaging, and more economy than previous microNOVA product offerings. Each family features high performance 16-bit NOVA architecture, extensive and mature software support, and a wide range of supporting interfaces and peripherals.

The economical microNOVA MP/100 family consists of microNOVA mN602 microprocessor; microNOVA MP/100 System Processing Unit (SPU), a highly functional board-level computer; microNOVA MP/100 packaged computer, a fully configured MP/100 SPU in a compact 8-slot chassis; microNOVA MP/200 System Processing Unit (SPU), a board-level computer with three times the speed of previous microNOVA processors. The high performance MP/200 family consists of: microNOVA MP/200 System Processing Unit (SPU), a board-level computer with three times the

speed of previous microNOVA processors; microNOVA MP/200 packaged computer, a fully configured MP/200 SPU in a compact 8-slot chassis; microNOVA MP/200-based system, a fully packaged computer system in a half-bay cabinet with choice of peripherals that combines true minicomputer performance with microcomputer flexibility.

Data General, Route 9, Westboro, MA 01581, (617) 366-8911.

CIRCLE 206 ON READER SERVICE CARD

CP/M FOR MICRAL C MICROCOMPUTER

The R2E Micral C small business microcomputer system is now compatible with the popular CP/M* Operating System, offering double-density mini-floppy drives and an optional 10/80

megabyte disk system with removable media.

With this system, the user can effectively utilize 320K bytes of floppy disk storage (standard) and up to 80 megabytes of optional hard disk storage (up to four disk drives, each with a 10 megabyte fixed and/or 10 megabyte removable disk). Other software available for the Micral C includes an advanced business applications BASIC language (BAL) with a sequential and random access file management system.

The end user price for a Micral C with dual double-density floppies, 32K of RAM, a 1920 character upper/lower case CRT display, keyboard and CP/M is $8995. The same system with a 10 megabyte disk is $15,950. Microsoft Extended Disk BASIC is $350; FORTRAN IV is $450 and COBOL is $675.

RZE of America, 47 Bedford St., S.E., Minneapolis, MN 55414, (612) 378-7060.

CIRCLE 207 ON READER SERVICE CARD

VisiCalc™
How did you ever do without it?

CIRCLE 192 ON READER SERVICE CARD

LSI-11/23, PDP-11/23 MICROCOMPUTERS

Digital Equipment Corporation has introduced the LSI-11/23, a new microcomputer. The first units will be shipped in the late summer of 1979. A rack-mountable, packaged version, the PDP-11/23, was also announced. Both versions can run the powerful RSX-11M and -11S operating systems previously available only on mid- to high-range PDP-11 minicomputers.

The LSI-11/23, a member of the fourth generation of the PDP-11 family, features 256 K bytes of memory capacity, four times greater than the low-end LSI-11/2. It uses the full instruction set of the PDP-11/34 minicomputer, and software-supported memory segmentation and protection features of the RSX-11M and -11S multitasking multiuser operating systems. The LSI-11/23 has the same small-size circuit boards as the LSI-11/2, permitting easier placement in instruments and specialized systems.

Besides accommodating RSX-11M and -11S software, the LSI-11/23 and PDP-11/23 run all software developed for the LSI-11 family without modification. This includes the RT-11 operating system and high-level languages including BASIC, FORTRAN IV, and FOCAL. Depending upon configuration, the LSI-11/23 is from 2 to 5 times faster than previous LSI-11 family members.

In 100-unit quantities, the LSI-11/23 and PDP-11/23 are priced at $1,758 and $4,500 respectively. The single-unit price of the PDP-11/23 is $6,800. A new PROM board for $300 and PROM blaster for $1,975 were also introduced for PROM-intensive LSI-11 applications.

Digital Equipment Corp., Maynard, MA 01754, (617) 481-7400.

CIRCLE 208 ON READER SERVICE CARD

PASCAL MICROCOMPUTER

A new micro-computer, the UDS 470, designed for use with PASCAL, is being marketed by Control Systems, Inc. The UDS 470 offers PASCAL-IN-PROM as an alternative to assembly language and BASIC for low- and medium-volume applications where power and fast development are important.

The UDS 470 is a rack-mountable system designed for industrial environments (high temperature, vibration, etc.). It currently uses the 6800 microprocessor, but can be upgraded to the 6809 or 68000 when they become available. The UCSD system was designed to be machine independent.

The standard UDS 470 package contains CPU with 1K RAM and 2K EPROM, serial I/O port with automatic reset and; VCC monitor; 32K RAM; 16K EPROM; floppy disks (double density, 5¼" diskettes with 204 Kb per side) with interface; power supply (5 volts); case; UCSD PASCAL; 6800 monitor and DOS; utility and test programs; and, may contain accounting, inventory and word-processing foundation programs; integral CRT/keyboard; and graphics (bit-mapped).

Control Systems, Inc., 1317 Central, Kansas City, KS 66102, (913) 371-6136.

CIRCLE 209 ON READER SERVICE CARD

MAINFRAME

The No Name mainframe will accommodate most S100 motherboards. It has a reset switch, keyed power switch, mainframe coating, rugged construction, connectors, power supply, and front panel for mini drives.

No Name, 15631 Computer Lane, Huntington Beach, CA 92649, (213) 431-7383, (714) 893-4120.

CLUSTER ONE

Nestar Systems introduces Cluster/One, a low cost distributed processing alternative to BASIC timesharing. The central Cluster/One unit, the Queen, connects to up to 15 personal microcomputers, the Drones, via a high-speed parallel data bus, the ClusterBus. An optional feature provides support for an additional 15 Drones. Currently supported as Drone stations are the Apple II and the Commodore PET 2001-8. Radio Shack TRS-80 support will be available shortly.

The Cluster/One concept permits each BASIC user to have his own computer, rather than a small share of one central processor. Thus, even real-time graphic applications or simulations become feasible. $4500.

Nestar Systems, Inc., 430 Sherman Ave., Palo Alto, CA 94306, (415) 327-0125.

CIRCLE 210 ON READER SERVICE CARD

MEMORY

STATIC RAM BOARDS

Gimix Inc., announces that it is now delivering 2 versions of 16K static RAM boards for the SS 50 bus. Both use TMS 4044 RAMS, have gold bus connectors, and are tested at 2 MHz. They have DIP switch controllable addressing, write protect, and enabling of each 4K block which allows, for example, the user to put

DAM YOUR COMPUTER

DATA ACQUISITION MODULES by CMC

NOW YOUR COMPUTER CAN LISTEN TO THE REAL WORLD YOU GET 16 8 BIT ANALOG INPUTS WITH OUR AIM16.

MEASURE - RECORD - CONTROL

- TEMPERATURE
- DIRECTION
- PRESSURE
- LIGHT LEVELS
- db
- POLLUTION CONTROLS
- DARKROOMS
- HUMIDITY
- LIGHT
- JOYSTICKS
- ENERGY CONSERVATION EQUIPMENT
- GREENHOUSES
- SPEED
- WEATHER STATIONS
- NOISE POLLUTION
- pH
- EARTHQUAKE TREMORS
- VELOCITY
- ACCELERATION
- GAMES

AIM16I STARTER SET

1 ·	AIM16I	16 ANALOG INPUTS 8 BITS · 100 MICROSEC
1 ·	POW1	POWER MODULE
1 ·	ICON	INPUT CONNECTOR · 20 PINS SOLDER EYELETS
1 ·	OCON	OUTPUT CONNECTOR · 18 PINS SOLDER EYELETS

$189.00

CONNECTICUT microCOMPUTER

150 POCONO ROAD · BROOKFIELD, CONNECTICUT 06804

(203) 775-9662

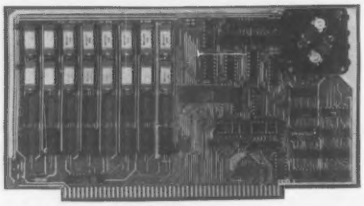
DAM SYSTEMS

CIRCLE 135 ON READER SERVICE CARD

4K in high memory for DOS, and the remaining 12K in low memory. $298.13. The deluxe version is socketed and GHOSTable (software controllable read-dressing, write protect, and enabling of each 4K block) for $368.16.

Gimix Inc., 1337 W. 37th Pl., Chicago, IL 60609, (312) 927-5510.

CIRCLE 211 ON READER SERVICE CARD



MEMORY BOARDS

Due to the decrease in memory prices, Central Data is announcing a substantial price reduction in its 16K-64K memory boards.

All Central Data memory boards come completely assembled, tested, and burned-in. The warrantee on the boards is one year. The entire memory area of the board is fully socketed, so that the user can expand his board without returning it to the factory.

The new prices are: 16K—$249, 32K—$375, 48K—$500, and 64K—$625. These reductions amount to over 20% on some boards.

Central Data Corp., P.O. Box 2484, Station A, Champaign, IL 61820, (217) 359-8010.

CIRCLE 212 ON READER SERVICE CARD

32K RAM BOARD

North Star Computers, Inc. recently introduced a 32K RAM board, doubling the memory density of the standard version of the popular Horizon computer. The RAM-32 runs at full speed, no wait states, with the 4 MHz Z80A microprocessor, as well as with slower Z80 and 8080 processors.

One feature of the North Star RAM-32 is parity-checking. Addressability of the RAM-32 is switch-selectable in four 8K regions. The RAM-32 has bank switching capabilities for those applications in which it is required. $659.

North Star Computers, Inc., 2547 Ninth Street, Berkeley, CA 94710, (415) 549-0858.

CIRCLE 213 ON READER SERVICE CARD

MEMORIES, KEYBOARDS, FOR PET

Bob Skyles, formerly chief engineer at Commodore for the PET project has announced the formation of his own company, Skyles Electric Works. The first products announced are a series of three memory expansion systems, 8, 16 and 24 Kilobytes of memory ($250 or 8K), and a full-sized keyboard ($125) all designed for the PET. Each unit, memory or keyboard, is designed to be installed without tools of any sort; plug-in sockets are used throughout.

Skyles Electric Works, 599 N. Mathilda Ave., Sunnyvale, CA 94086, (408) 735-7891.

CIRCLE 214 ON READER SERVICE CARD

PERIPHERALS

SYNCHRONOUS DATA COMMUNICATION

Analogics, Inc. announced the availability of a hardware and software package for synchronous data communications. The package is designed as an add-on to existing S-100 bus microcomputers and is compatible with the CP/M floppy disk operating system.

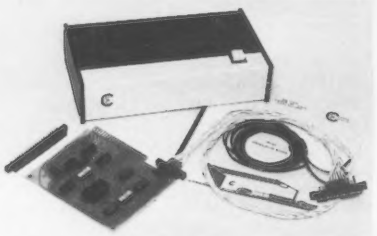
Capable of operating at up to 9600 baud, the package makes possible reliable, high speed communications over ordinary telephone lines. Equipped with the package a system can communicate with a similar system or with IBM installations using the Binary Synchronous Communications Protocol. In the latter case the system can be configured for IBM 3780 or 3741 emulation.

Minimum hardware requirements include a 24K S-100 bus computer equipped with a Z-80 microprocessor, dual floppy disks and the CP/M operating system. A synchronous I/O interface card complete with modem interface and RS-232 cable connector is included in the package. The card occupies one slot of the S-100 bus chassis. An external modem (not supplied) is required to complete the connection to the ordinary dial-up telephone network.

The programs supplied include the Bysinc communications program and utilities for formatting disk files for transmission and decoding received data for terminal or printer output. The batched commands capabilities of the CP/M operating system can be used to structure communication sessions with a minimum of operator intervention. The package is priced at $895 and includes interface card, software on IBM compatible floppy disk and user manuals.

Analogics, Inc., 22030 Clarendon St., Suite 101, Woodland Hills, CA 91367, (213) 347-1885.

CIRCLE 215 ON READER SERVICE CARD



EXTERNAL DEVICE CONTROL SYSTEM FOR TRS-80 AND PET

Able to sense up to 24 inputs and drive 16 medium power outputs, the SY-16 is a plug compatible turnkey control system with all software and hardware furnished.

The 16 output devices can be any 6 volt or less ON/OFF mechanism using less than ¼ Ampere. For example, lamps, LEDs, solenoids, stepping switches, and DC motors are typically used.

CMC

PET ANALOG INPUT

DAM SYSTEMS

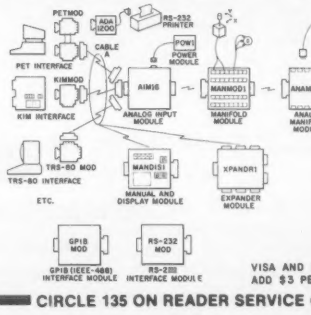
Analog to Digital Conversion System for the Commodore PET Computer

Give the PET the ability to sense, measure, and control the world around it with DAM SYSTEMS modules. Just plus the PETSET1 into the PET to get 16 channels of analog input. Screw terminals are provided for each channel so you can hook up joysticks, pots, or whatever appropriate sensors you have.

Each of the 16 analog inputs, in the ranse of 0 to 5.12 volts, is converted to a decimal number between 0 and 255 (20 millivolts per count). Conversion time is 100 microsconds.

In addition, the PETMOD provides two IEEE ports and one user port as well as a DAM SYSTEMS port.

Software is provided. A one line program is all that is necessary to read a channel.



PETSET1

1 - AIM16	-	16 ANALOG INPUTS - 8 BITS - 100 MICROSEC
1 - PETMOD	-	PET ADAPTER - 2 IEEE PORTS - 1 USER PORT - 1 DAM SYSTEMS PORT
1 - CABLE A24	-	24 INCH INTERCONNECT CABLE
1 - MANMOD1	-	MANIFOLD MODULE - SCREW TERMINALS FOR INPUTS, REFERENCE, GROUND
1 - POW1	-	POWER MODULE

PETSET1a for 110 VAC $295
PETSET1e for 230 VAC $305
Order direct or contact your local computer store.

CONNECTICUT microCOMPUTER, Inc.
150 POCONO ROAD
BROOKFIELD, CONNECTICUT 06804
TEL: (203) 775-9659 TWX: 710-456-0052

VISA AND M/C ACCEPTED - SEND ACCOUNT NUMBER, EXPIRATION DATE AND SIGN ORDER.
ADD $3 PER ORDER FOR SHIPPING & HANDLING - FOREIGN ORDERS ADD 10% FOR AIR POSTAGE.

CIRCLE 135 ON READER SERVICE CARD

Expand your TRS-80. Save $100.

Meet the Vista V80 Mini Disk System. The perfect way to upgrade your TRS-80* system. Inexpensively. (Our $395.00 price is about $100.00 less than the manufacturer's equivalent.) Here's how it can help you.

23% more storage capacity. Useable storage is increased from 55,000 to 65,000 bytes on drive one.

8 times faster. While electronically equal to the TRS-80 Mini-Disk system, track-to-track access is 5ms versus 40ms for the TRS-80.

Better warranty. The V80 carries a 120 day warranty – longer than any comparable unit warranty available.

The Vista V80 Mini Disk System comes complete with Minifloppy disk drive, power supply, regulator board and case. And it's ready to run – simply take it out of the box, plug it in and you're ready to go. Dealer inquiries invited.

Vista

1320 East St. Andrews Place, Suite I
Santa Ana, California 92705
(714) 558-8813

At Vista, we mean business.

CIRCLE 187 ON READER SERVICE CARD

*TRS-80 ©Tandy Corp.

Input devices can be TTL gates, or any form of switch contacts, including thermostats, reed switches, microswitches, joysticks, keyswitches and numeric keypads.

The SY-16 comes completely assembled, tested and ready to plug into TRS-80s (model T) or PETs (model P) with software and comprehensive instruction manual describing sequence design, I/O device control, and timing/Control sequences. $289.

Cooper Computing, Box 16082, Clayton, MO 63105.

CIRCLE 216 ON READER SERVICE CARD

EIGHT SERIAL PORT BOARD

Trace has announced an eight serial port (ESP+) board for the S-100 bus, as the first of three boards and associated license software to comprise a data communications subsystem. In addition to eight, full-duplex serial ports, the ESP+ provides memory bank switching, two (or one, if bank switching is used) eight-bit, bi-directional parallel ports, an eight-bit sense switch, and three, sixteen-bit counters which may be used independently or in tandem for interval interrupt and non-standard baud rate generation. Each port may run at any of nine baud rates from 110 to 9600. Interrupt modes are provided for each counter, serial port and parallel port.

Three options are available: a six digit time of day clock accessible through the ESP+. An external LED display clock is included with this option. A modem controller to handle incoming lines from up to eight modems. The controller provides handshaking, auto answer, interrupt on ring indicator and allows option selection and setup through software by means of five configuration registers. A software baud rate controller to select the baud rate for each serial port independently. Default rates may also be selected and may be activated by system reset or through software. The current baud rate may be referenced by the processor. $895.

Trace Electronics, Inc., 570 West Dekalb Pike, King of Prussia, PA 19406, (215) 265-9220.

CIRCLE 217 ON READER SERVICE CARD

MICROMODEM II

The Micromodem II adds new dimension to your Apple II personal computer. This complete data communication system plugs directly into an Apple II expansion slot and is ready to use in terminal mode or answer the telephone for remote console. FCC registration, automatic dialing, automatic answering and built-in programmed memory are provided in one package. The result is a computer to computer/terminal to computer modem for use in personal and small business systems.

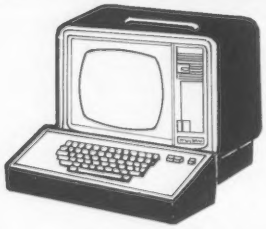
The MICROMODEM II provides all the capabilities of a communications interface card and an acoustic coupler, with the addition of programmable automatic dialing and answering.

D.C. Hayes Associates, Inc., 16 Perimeter Park Dr., P.O. Box 9884, Atlanta, GA 30319, (404) 455-7663.

CIRCLE 218 ON READER SERVICE CARD

FLOATING-POINT ARITHMETIC FOR THE 6800

Wintek Corporation announced the introduction of their Floating-Point Arithmetic/Scientific Function Package for the Motorola 6800 family of microcomputers. The package operates on nine



FOR LOW PRICES
ON QUALITY COMPUTERS
CALL

1-800-633-8724

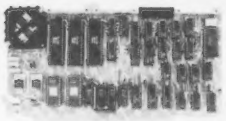
THE LOGIC STORE

formerly Plainsman Micro Systems

P.O. Box 1712
Auburn, Alabama 36830

SALES & SERVICE FOR
Altos - Commodore - Compucolor -
Billings - HDE

BUILDING BLOCKS FOR
MICROCOMPUTER SYSTEMS,
CONTROL & TEST EQUIPMENT



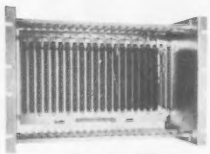
R² I/O

2K ROM
3 SERIAL PORTS

2 K RAM
1 PARALLEL PORT

TT-10

TABLE TOP MAINFRAMES



ECT-100-F

RACKMOUNT CARD CAGES

POWER SUPPLIES, CPU's,
MEMORY, OEM VARIATIONS

SPECIALIZING
IN
QUALITY
MICRO-
COMPUTER
HARDWARE

INDUSTRIAL
EDUCATIONAL
SMALL BUSINESS
PERSONAL

ELECTRONIC
CONTROL
TECHNOLOGY

763 RAMSEY AVE.
HILLSIDE, N.J. 07205

(201) 686-8080

CIRCLE 142 ON READER SERVICE CARD

digit BCD values providing both high accuracy and easy conversion for input and output. Addition, subtraction, multiplication, and division are included in the arithmetic operations, while 16 scientific functions are also available: sin, cosine, tangent, arcsin, arcosine, arctangent, hyberbolic sin, cosine and tangent, e raised to a power, 10 raised to a power, natural logarithm, log base 10, exponentiation, square root, and inversion.

The package is written in 6800 assembly language and is supplied on either seven- or nine-track tape. The argument passing and calling protocol conform to the standard Wintek PL/W high-level language calling sequence allowing easy use with either PL/W or assembly language programs.

The package is available for $500, or as part of the complete Wintek Cross-Software package for the 6800, including PL/W compiler, Cross-Assembler, Cross-Linker, and Simulator for $3400.

Wintek Corporation, 902 N. 9th St., Lafayette, IN 47904, (317) 742-6802.

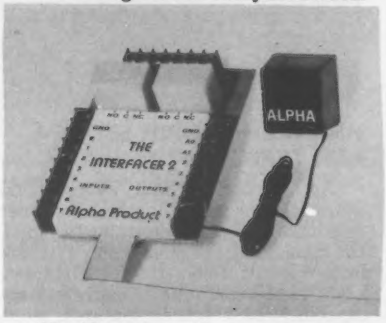
CIRCLE 219 ON READER SERVICE CARD

INTERFACER 2

A new Input/Output interface designed to work with Radio Shack TRS-80 micro computer is announced by Alpha Product Co. The Interfacer 2 is designed to enable microcomputer users to control and sense a variety of external devices. There are 8 output channels and 8 input channels. Using these 16 channels, the TRS-80 can switch or control appliances, motors, or solenoids or drive LED's or sounding devices. The inputs can sense switch closures, photosensors or logic levels.

The Interfacer 2 plugs directly into the 40 pin edge connector on the rear of the TRS-80 micro computer interface. Control of the inputs and outputs is accomplished by simple Level-II Basic INP and OUT statements.

Two of the outputs are SPDT relays, the other six are TTL level. Up to six more relays can be controlled externally. Two of the inputs are opto-isolated so that varying voltages can be sensed safely. All 8 inputs will accept either contact closure or TTL level logic. Other families of logic can be easily interfaced.



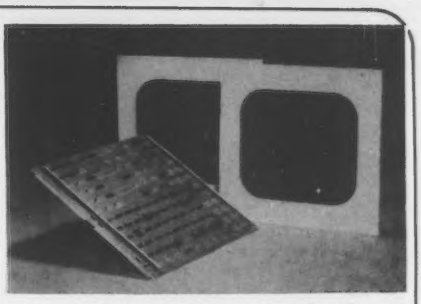
The "Interfacer 2" comes completely assembled, tested and ready to use. Power supply, connector cable and user's manual are included. The price is $85.00 plus $3.00 for shipping and handling.

Alpha Product Company, 85-71, 79th St., Woodhaven, NY 11421, (212) 296-5916.

CIRCLE 220 ON READER SERVICE CARD

SCROLL AND ZOOM MODULE

Labeled the GCT-3037-1, a new dual-function Scroll and Zoom Module that allows a Genisco high resolution (512^2 or 1024^2) raster graphics color or monochrome computerized display to scroll pixel-by-pixel horizontally and line-by-line vertically, or zoom to twice, four times or eight times the original picture size, all without changing the contents of



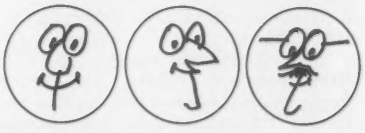
the system's refresh memory has been announced by Genisco Computers, a Division of Genisco Technology Corporation.

Data can be vertically scrolled on an individual line-by-line basis and pixel-by-pixel, horizontally. The display can also be wrapped around in both vertical and horizontal modes to provide up, down, left or right scrolling motion—a "waterfall effect." Thus, hardware can easily be used to satisfy many applications that have been extremely difficult, complex and costly to achieve by other means. The resulting action—continuous movement of graphics data—is applicable to war-games simulation, animation, monitoring of changing physical parameters (as in strip-charting and repetitious patterns) and a broad spectrum of other uses where simply controlled motion is a requisite.

Zoom enlargements—which are operator selectable—can be two, four or eight times the data in the refresh memory. These enlargements are directly displayed on the full CRT screen. $1000.

Genisco Computers, 17805 Sky Park Circle Dr., Irvine, CA 92714, (714) 556-4916.

CIRCLE 221 ON READER SERVICE CARD



CMC

KIM ANALOG INPUT

DAM SYSTEMS

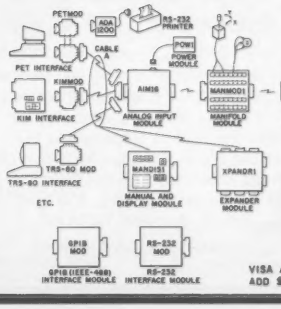
Analog to Digital Conversion System for the KIM Computer

Give the KIM the ability to sense, measure, and control the world around it with DAM SYSTEMS modules. Just plug the KIMSET1 into the KIM to get 16 channels of analog input. Screw terminals are provided for each channel so you can hook up joysticks, pots, or whatever appropriate sensors you have.

Each of the 16 analog inputs, in the range of 0 to 5.12 volts, is converted to a decimal number between 0 and 255 (20 millivolts per count). Conversion time is 100 microseconds.

The KIMMOD provides one user port as well as a DAM SYSTEMS port.

Software is provided.



KIMSET 1

1-AIM161	- 16 ANALOG INPUTS - 8 BITS - 100 MICROSEC
1-KIMMOD	- KIM ADAPTER - 1 USER PORT - 1 DAM SYSTEMS PORT
1-CABLE A24	- 24 INCH INTERCONNECT CABLE
1-MANMOD1	- MANIFOLD MODULE - SCREW TERMINALS FOR INPUTS, REFERENCE, GROUND
1-POW1	- POWER MODULE

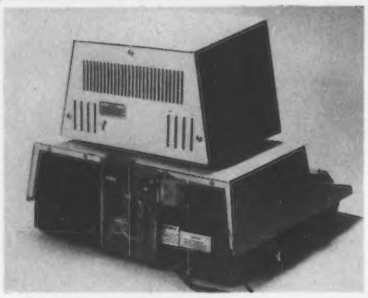
KIMSET1a for 110 VAC $ 285
KIMSET1a for 230 VAC $ 296

Order direct or contact your local computer store.

CONNECTICUT microCOMPUTER, Inc.
150 POCONO ROAD
BROOKFIELD, CONNECTICUT 06804
TEL: (203) 775-9659 TWX: 710-456-0052

VISA AND M/C ACCEPTED - SEND ACCOUNT NUMBER, EXPIRATION DATE AND SIGN ORDER.
ADD $3 PER ORDER FOR SHIPPING & HANDLING - FOREIGN ORDERS ADD 10% FOR AIR POSTAGE

CIRCLE 135 ON READER SERVICE CARD



GPA ELECTRONICS

GPA's hardcopy interface for the Commodore PET uses the IEEE-488 bus. Parallel signals are converted to serial signals by a UART. All logic signals are converted to the proper levels. For output, you get a standard DB-25 female connector.

For the TRS-80 GPA has introduced an expansion motherboard which allows a modular approach to expansion of a TRS-80 system. There is also a Parallel I/O Card which consists of two dip-switch addressable, parallel input-output ports. The ports are selectable between 0 and 255.

The EPROM Firmware Card holds up to four 2708 EPROMS, occupying the top 4K of TRS-80 memory, (F000-FFFFH).

GPA Electronics, Inc., P.O. Box 7410, Oakland, CA 94601, (415) 654-3898.

CIRCLE 222 ON READER SERVICE CARD

FLOPPY DISC AND TAPE STORAGE

Z-80 FLOPPY DISK CONTROLLER

Applied Micro Technology, Inc., announces the introduction of an important new product for users of STD BUS Z-80 microprocessor systems, the FD-100-STD Floppy Disk Controller.

The FD-100 will support up to four IBM standard format soft-sectored floppy disks, in either the full 8" size or the 5¼" mini size. The software controllable flexibility of the FD-100 allows intermixing of both types of drives. A motor ON/OFF control circuit for mini-floppies is provided as a standard feature. All disk drive status lines are available to the host processor. $215.

Applied Micro Technology, P.O. Box 3042, Tucson, AZ 85702, (602) 795-9929.

CIRCLE 223 ON READER SERVICE CARD

RS232 MINI FLOPPY STORE & EDIT TERMINAL

An economical Mini Floppy Disk Terminal designed to attach between existing ASCII printer/display terminals and their RS232 modems is now available from Western Telematic, Inc. DataMate has a 71,680 character working storage capability, easy editing features, store-edit-forward applications, the capacity of 560 addressable records of 128 characters each. The unit provides two search modes, switch selectable baud rates from 110 to 9600 band, and full X-ON/X-OFF control. Its editing features include back-space-erase, insert, delete, modify, link and stop. A "GO TO" command allows jumping to random file locations for repeat and linking applications. $1795.

Western Telematic Inc., 2435 S. Anne St., Santa Ana, CA 92704, (714) 979-0363.

CIRCLE 224 ON READER SERVICE CARD

NEW CD2 + 2 OPTION

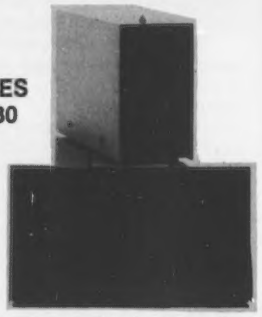
Ohio Scientific's new CD2+2 option provides a big step up from the storage limitations of the standard double-floppy system. With the CD2+2 option, Ohio Scientific C3 systems operating under the OS-65U Disk Operating System will gain an increase in storage availability from the approximately 275K bytes per disk surface of the standard double-floppy system to 1.1 Megabytes of storage. By utilizing both sides of the magnetic medium, the CD2+2 option doubles storage capacity. OS-65D DOS users will experience similar storage increases to about 1 Megabyte.

CD2+2's increased storage also results in time savings. The ability to store multiple copies of working files on various operating disks can reduce or eliminate the numerous disk swapping operations which might otherwise be required. This advantage increases the productivity in business inventory and data-base management operations. $1200.

Ohio Scientific, 1333 Chillicothe Rd., Aurora, Ohio 44202, (216) 562-3101.

CIRCLE 225 ON READER SERVICE CARD

ADD-ON DISK DRIVES FOR TRS-80



The Microcomputer Technology, Inc. single-head disk drive family (TF-X) offers the user a choice of MPI, Pertec, or Shugart SA400 mini floppy disk drives for the TRS-80. Shugart is the same device offered by Radio Shack, while the Pertec provides quieter operation and the use of the Floppy diskette (uses both sides). The MPI unit provides additional features normally found in the larger 8" disk drives such as door lock and automatic diskette ejection.

Prices for the TF-X single head units start at $379.

MTI's dual headed units (TDH-X) provide the same capacity as two single

MAKE $1,000 IN 7 DAYS WITH A COMPUTER!

MONEYMAKERS JOURNAL

15 starting ideas, $1,000 BONUS IDEA, software, business assistance. Each month new ideas, software, sample ads, Q&A section, hints, and humor. ONE YEAR $20.00. Idea book only $5.00.

COMPUTER CONSULTANTS

312 Hoyt St., Dunkirk, N.Y. 14048

S.A.S.E. for details.

Come Help Us Celebrate The Child

St. Jude Children's Research Hospital continues its search for life-saving knowledge about childhood diseases. And this search continues because people care. Help us celebrate the child by sending your tax-deductible check or request for further information to St. Jude Children's Research Hospital, 539 Lane Ave., Memphis, TN 38105.

ST. JUDE CHILDREN'S RESEARCH HOSPITAL

Danny Thomas, Founder

SOLID STATE & HOBBY CIRCUITS MANUAL

$1.95 postpaid to your door. The new manual offers over 400 pages of circuits for the hobbyist, engineer, experimenter and do-it-yourself kit builder. HURRY — Supply limited. Free catalog. Frazer & Associates, 1888 Century Park East Suite 10, Century City, Calif. 90067

CIRCLE 151 ON READER SERVICE CARD

headed drives at a substantial savings in space and money. The TDH-X units are priced at $675.

Interfacing of the MTI add-on disk drives to the TRS-80 is accomplished via the Radio Shack TRS-80 expansion interface, which can accomodate up to four single headed drives or two double headed drives. Operating software is available from Radio Shack.

Microcomputer Technology, Inc., 2080 S. Grand Ave., Santa Ana, CA 92705 (714) 979-9923.

CIRCLE 226 ON READER SERVICE CARD

TERMINALS

QUICK PRINTER

Radio Shack has introduced an inexpensive printer that produces low-cost hard-copy output on 2-3/8" wide aluminum coated paper.

The new Quick Printer II prints both upper and lower case characters, as well as double-size characters and double-spaced characters to allow for special effects such as titling pages or printing headings.

Automatic "wrap-around" prevents data loss due to overflow when the text exceeds the maximum line length, according to Radio Shack. The printer is software selectable for 16 or 32 characters per line, and produces 120 lines per minute, 64 characters per second.

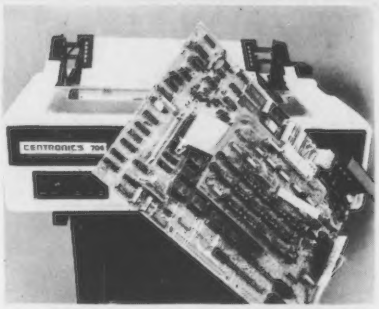
Character set is a modified subset of ASCII, 96 characters with upper and lower case, 5 x 7 dot matrix, 6 lines per inch vertical spacing. It can produce all 32 ASCII control codes in addition to codes for the printed characters.

Although designed for use with Level-II TRS-80 systems, the printer is also said to be usable with a variety of other computers. Quick Printer II features three standard interfaces: TRS-80, RS-232C, and 8-bit parallel. It can be connected directly to the TRS-80 CPU, or, with optional cable, to the TRS-80 expansion interface. Operates on 120 VAC. Size: 3-5/16 x 6-3/4 x 9-1/4". $219.

Radio Shack Computer, 1300 One Tandy Center, Fort Worth, TX 76102, (817) 390-3272.

CIRCLE 227 ON READER SERVICE CARD

The best way to have a good idea is to have lots of ideas.—Linus Pauling



FLEXIBLE 1200 BAUD RO DATA COMMUNICATIONS PRINTER

Centronics Data Computer Corp. announced its Model 704 data communications printer. High throughput from 70 to 400 lines-per-minute in the Model 704 is achieved via the printers 180 character-per-second print speed which is capable of infinitely sustaining a 28-character line length at 1200 baud. The Model 704 has built-in RS-232C serial interface and operator selectable line protocols; and, excellent print quality is provided in the Model 704 through such standard features as a nine-pin free-flight print head and a full 96-character ASCII set.

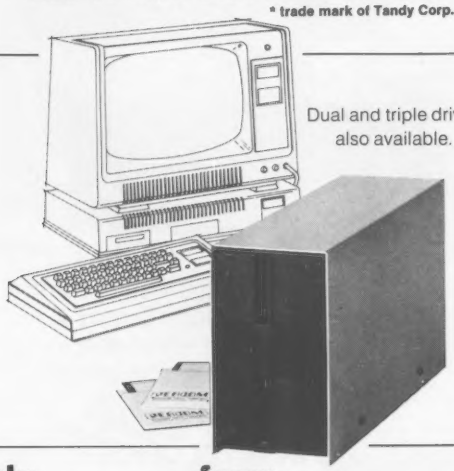
Centronics Data Corp., Hudson, NH 03051, (603) 883-0111.

CIRCLE 228 ON READER SERVICE CARD

NOW...

Add-on Mini-Disc for the TRS-80*

* trade mark of Tandy Corp.



Dual and triple drives also available.

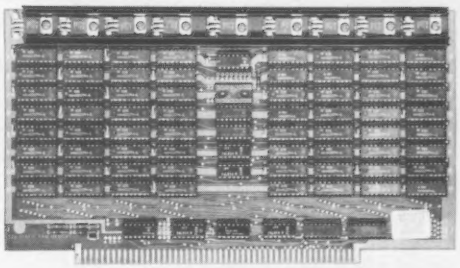
only $399.00

from PERCOM

Requires 16K RAM, Level II BASIC and Expansion Interface.

PERCOM DATA COMPANY, INC.
DEPT. C • 211 N. KIRBY • GARLAND, TEXAS 75042
Phone: (214) 272-3421 or
Call toll free: 1-800-527-1592

Tarbell 32K RAM Memory



★S-100 BUS ★ ★300ns★ ★STATIC MEMORY★
★9 REGULATORS PROVIDE EXCELLENT HEAT DISTRIBUTION★
★EXTENDED ADDRESSING (Bank Switching)★
★LOW POWER REQUIREMENT★
★PHANTOM LINE★
★20 PAGE OPERATING MANUAL★
★FULL 1-YEAR WARRANTY★

FULLY ASSEMBLED AND TESTED . . . . . $625.
SAME BOARD WITH ONLY 16K INSTALLED . . . . $390.

Please send check or money order. No CODs or credit will be accepted on this item. California residents please add 6% sales tax.

Tarbell Electronics 950 Dovlen Place • Suite B • Carson, Calif. 90746 (213) 538-4251 (213) 538-2254

NON-IMPACT PRINTER

Comprint's Model 912 non-impact printer is designed to meet the rapidly growing need for low-cost printers essential to small business systems, CRT terminal hardcopy, home computers, message networks and industrial/scientific data logging.

Alphanumeric images in the full 96-character ASCII set, with upper and true lower case, are delivered by the 912. The print medium is a unique 9 x 12 printhead matrix that generates overlapping dots to create more fully formed characters. The Comprint unit writes 80-column lines quietly and at high speed, 225 characters/second (170 1pm), on 8½" wide paper. IEEE-488 and strobe/acknowledge are supplied with the parallel-interface model, $560; RS-232C and 20-MA current loop are available on the serial-interface model priced at $39 more.

Computer Printers International, Inc., 280 Polaris St., Mountain View, CA 94043, (415) 969-6161.

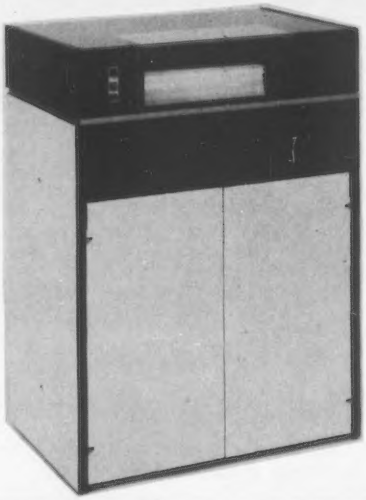
CIRCLE 229 ON READER SERVICE CARD

300 LPM IMPACT PRINTER

Local Data has a new line printer with full character set featuring a Teletype Model 40 print mechanism called the QUIET 300.

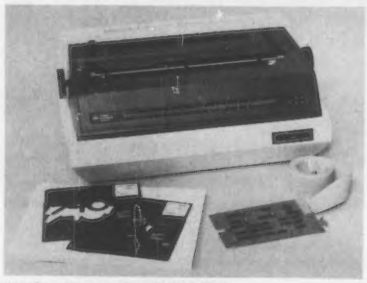
The mechanism is a 300 LPM, line-at-a-time, hard-copy, impact printer which prints up to six part forms. Friction or tractor feed is available with the 80-column unit and tractor feed with the 132-column unit.

This printer features a Centronics or Dataproducts compatible parallel interface or a Buffered-Serial interface. 132-col printer $4595.



Local Data Co., 2741 Toledo St., Suite 214, Torrance, CA 90503, (213) 320-7126.

CIRCLE 230 ON READER SERVICE CARD



WORD PROCESSOR FOR PDP 11/03

Add to the PDP 11's existing functions the ability for text editing and document printing. Provided in this add-on is a Daisy Wheel RO Printer, an interconnecting cable, and an interface card which plugs directly into the PDP 11/03 bus. Software consists of a handler, a text editor which works with VT-52 or VT-100 proportional word spacing for top quality appearance in both letters and documents.

100 Plus Corporation, 701 Trinity St., South Plainfield, N.J. 07080, (201) 753-4460.

CIRCLE 231 ON READER SERVICE CARD

PET WORD PROCESSOR

This program permits composing and printing letters, flyers, advertisements, manuscripts, etc., using the COMMODORE PET and a printer.

Script directives include line length, left margin, centering, and skip. Edit commands allow the user to insert lines, delete lines, move lines and paragraphs, change strings, save onto cassette, load from cassette, move up, move down, print and type.

The CmC Word Processor Program addresses an RS-232 printer through a CmC printer adapter.

The CmC Word Processor program is available for $29.50. Add $1.00 for postage and handling per order.

Order direct or contact your local computer store.

VISA

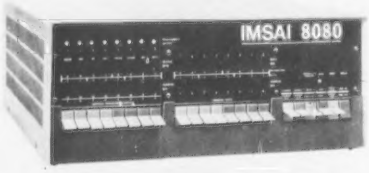
master charge

CmC

CONNECTICUT microCOMPUTER
150 POCONO ROAD
BROOKFIELD, CONNECTICUT 06804
(203) 775-9659

CIRCLE 135 ON READER SERVICE CARD

Bits Bytes Books Bargains



IMSAI • Cromemco • SWTPC • Lear-Siegler • Problem Solvers • RCA • North Star • Verbatim • ALPHA Micro Systems and others

Fast, off the shelf delivery.
Give us a call TOLL FREE
800/523-5355

MARKETLINE SYSTEMS, Inc.
2337 Philmont Ave., Huntingdon Valley, Pa. 19006
215/947-6670 • 800/523-5355
Dealer Inquiries Invited

CIRCLE 147 ON READER SERVICE CARD

HIGH DENSITY DOT MATRIX PRINTER

Centronics Data Computer Corp. announced the Model 753 printer designed to unlock throughput-bound word processors while also providing near letter-quality print generation.

Through a combination of features such as its high density dot matrix print quality 130 to 150 character-per-second throughput, proportional spacing and right justification, the microprocessor controlled Model 753 offers premium single-pass print quality and flexibility at speeds up to five times faster than throughput bound daisy wheel printers. $2895.

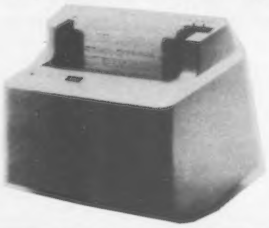
Centronics Data Computer Corp., Hudson, NH 03051, (603) 883-0111.

CIRCLE 232 ON READER SERVICE CARD

IMPACT PRINTER

The Model 440 PAPER TIGER printer from Integral Data Systems is an impact printer that has software-selectable character sizes, full upper and lower case 96-character ASCII set, and 80 and 132 column formats.

Standard PAPER TIGER features include: upper and lower case character set; adjustable form width; forms control with eight standard form lengths; both 80 and 132 column formats; choice of six or eight lines-per-inch vertical spacing; software-selectable character density; automatic multi-line buffering; and both RS-232C serial and Centronics-compatible parallel interfaces. Multiple transmission rates from 110 to 1200 BAUD are also switch selectable. The new printer uses a stepper-motor paper feed to insure fast and reliable paper movement, and an automatic re-inking mechanism extends ribbon life. An optional, 2K buffer/graphics package provides full dot-plotting graphics capability, and the larger, 2K-byte buffer holds a full CRT screen, 1920 characters. The variable character size feature permits program controlled highlighting and formatting of copy. The size of a single character can be controlled. $995.



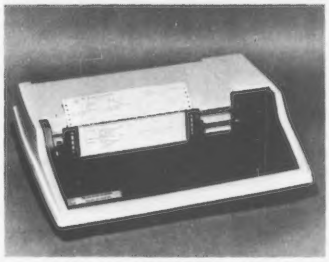
Integral Data Systems, Inc., 14 Tech Circle, Natick, MA 01760, (617) 237-7610.

CIRCLE 233 ON READER SERVICE CARD

NEW TERMINAL

Intertec Data Systems Corporation has announced a new video display terminal. Standard features include an upper and lower case character set displayed on an 8 x 10 dot matrix; a full 24 line by 80 character screen; a status line which is displayed in half intensity; a complete ASCII keyboard with an 18 key numeric pad; 14 user defined function keys; full cursor addressing; automatic repeat of all keys; individual backspace and shiftlock keys and a graphics mode to

AVAILABLE NOW



$1695 T.I. 810 printer

- 150 cps bi-directional impact printer
- Tractor feed, 3" to 15", up to 6-part
- Programmable forms length
- EIA RS-232 serial, 110-9600 baud

Options:

- Upper/lower case $90—Stand & paperbasket $135
- Forms Length Control $90—Vertical Format Control $180
- FLC/Compressed Print $180—VFC/Compressed Print $270

SOROC IQ 120 $795

- Upper/lower case, 24 X 80 12" display
- Numeric keypad, cursor control keys
- RS-232 interface plus extension port

Need more intelligence?

SOROC IQ 140 $1345

Need a Texas Instruments portable, ASR or KSR?

Call MICROMAIL

Teletype 43 $999

- Upper/lower case, 132 columns
- RS 232 serial, 110 or 300 baud
- 12" X 8½" pin-feed paper

(1620 pictured)

Diablo 1641/3 $2910

- Letter-quality printing
- HyType II daisywheel printer
- RS 232 serial, 110-1200 baud

FROM MICROMAIL

To order: Send a certified check or money order. Personal or company checks require two weeks to clear.
Handling: Less than $2000, add 2%; over $2000, add 1%.
Tax: California residents add 6% sales tax.

All terminals shipped freight collect In original carton with manufacturer's warranty.

Write for free catalogue

MICROMAIL • BOX 3297 • SANTA ANA, CA 92703
(714) 731-4338

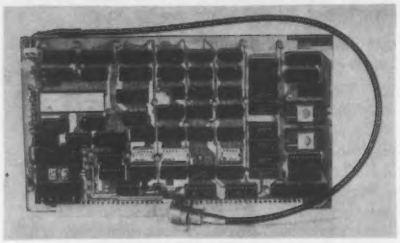
CIRCLE 167 ON READER SERVICE CARD

facilitate easy design and display of all types of forms. A hooded display cuts down on glare and gives extra privacy. A wide bandwidth monitor provides sharp images everywhere on the screen with below-the-line character descenders to make reading easier. The unit also includes such standard features as a high powered text editing system with character and line insert/delete; full and/or partial block transmit modes; programmable end-of-line terminators; protected fields and a self-test mode for easy maintainability. The InterTube's interface is RS-232C and operates through the range of 50-9600 BPS. A standard RS-232C printer port operates through the same range. Noteworthy design features of the InterTube II include its simplistic component layout which allows for fast, efficient modular servicing of the unit and assures ruggedness and reliability in any application. The InterTube II is available for immediate delivery from Intertec's new manufacturing facility in Columbia, South Carolina. OEM prices range from $798-$598 depending on quantity. Dealerships available. For more information contact

Intertec Data Systems Corporation, 2300 Broad River Road, Columbia, South Carolina, (803) 798-9100.

CIRCLE 234 ON READER SERVICE CARD

The most remarkable piece of research apparatus is the human brain.—B. Houssay



SS 50 BUS VIDEO BOARD

Gimix Inc. announces a 80 x 24 video board with hardware scrolling, x-y addressable cursor and multiple character generators for the SS 50 bus that allows user-defined programmable character sets. It includes a TMS 2716 EPROM that contains a full 128 upper and lower case ASCII character set with true descenders; plus a socket for another TMS 2716 for an optional 128 character set; plus 2K of RAM for user-defined programmable character sets. This gives the user the ability to create his own hieroglyphics, alphabet, graphic elements, etc. and store them on PROM, disk, or tape.

The user can choose and intermix 384 different characters from any or all of the character generators and display up to 256 at one time, normally or inversely, and at full or half intensity, at any location on the screen. Contiguous 8 x 10 character cells permit solid lines and connecting patterns with user definable graphic elements.

It is addressable to any 2K boundary. GHOSTable addressing allows multiple boards at the same address, making it ideal for multi-user applications. Custom screen and character cell formats and European versions are available. The available software includes a GMXBUG video based 3K ROM monitor, stand alone driver routines, and a program to create user defined characters.

Gimix Inc., 1337 W. 37th Pl., Chicago, IL 60609, (312) 927-5510.

CIRCLE 235 ON READER SERVICE CARD

GRAPHICS FOR DECWRITER PRINTERS

Selanar Corporation introduces a low cost graphics modification to the DECwriter printer. Available as an upgrade to existing printers or factory installed with a new printer. The product features vector generated graphics, expanded character styles, improved speed, and numerous DEC offered options as standard.

The average printer speed has been increased to 50 characters per second. EIA RS-232, 20 MA current loop and TTL interfaces; auto linefeed; top forms; and horizontal and vertical tabs. $850.

Selanar Corp., 3054 Lawrence Expressway, Santa Clara, CA 95051.

CIRCLE 236 ON READER SERVICE CARD

TRS-80 LEVEL II AND DOS

GENERAL SUBROUTINE FACILITIES 'GSF'
Collection of fast easy-to-use machine language routines.
IN-MEMORY SORT with multiple variables and keys.
SORT 1000 - Element array in 9 seconds.
ARRAY read/write to tape, compress/uncompress/move data.
SCREEN scrolling, save screen displays, and more

DISK SORT PROGRAM 'DSP'
SORT/MERGE multi-diskette files. Fast and easy to use.
MULTIPLE variables and keys. User input/output sort exits.
Includes GSF machine language in-memory sort, etc. 32 or 48K.

RENUMBER WITH 'REMODEL' - MERGE WITH 'PROLOAD'
REnumber any section or an entire program.
MOve program segments. DELete program lines.
All line references readjusted as required.
COMBINE programs with renumber and merge.
LOAD or SAVE any portion of program from tape.

COPY SYSTEM TAPES WITH 'COPSYS'
COPY and VERIFY machine language object tapes.
MERGE object tapes to form single load module.

MICROCOMPUTER CASSETTES 'C-20's'
SPECIAL formulation optimized for microcomputers.
Extremely broad FREQUENCY response. Clean recordings.
Exceptional DENSITY characteristics. Broad range. Consistency.

REMODEL	Order TS21E at $24.95
REMODEL + PROLOAD	Order TS22E at $34.95
GENERAL SUBROUTINE FACILITIES	Order TS25E at $24.95
DISK SORT PROGRAM	Order TS26E at $34.95
Must specify 16, 32, or 48K on above. System house discounts.	
COPSYS (Not DOS)	Order TS24E at $14.95
For TAPES that TEST best	Order 10 ea at $14.95

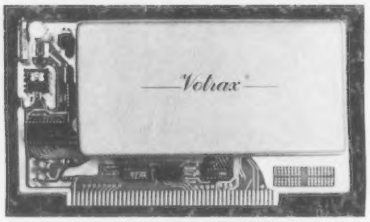
User Manuals $3.00 refundable on program purchase.

RACET COMPUTES
702 Palmdale, Orange CA 92665

Check, VISA, M/C, C.O.D.
Calif. residents add 6%
(714) 637-5016

CIRCLE 177 ON READER SERVICE CARD

AT LAST!!! AN AFFORDABLE, S100 BASED, SPEECH SYNTHESIZER, THAT IS UNDERSTANDABLE, EASY TO USE, AND DOESN'T MONOPOLIZE YOUR COMPUTER'S TIME AND RESOURCES.



VS-K S100

FEATURING:

- BUILT-IN AUDIO AMPLIFIER
- USER PROGRAMMABLE VOCABULARY — 64 phonemes allow pronunciation of any word.
- LOW DATA REQUIREMENTS — 15 bytes per second supports continuous speech.
- LOW LEVEL SOFTWARE DRIVERS INCLUDED.
- 500 WORD DICTIONARY INCLUDED.

ALL FOR ONLY $495.00 ASSEMBLED AND TESTED
OTHER MODELS STARTING FROM ONLY $375.00

FOR FURTHER INFORMATION WRITE OR CALL:
JHM MARKETING ASSOCIATES
4340 CAMPUS DR., SUITE 212
NEWPORT BEACH, CA. 92660
(714) 557-9181

CIRCLE 157 ON READER SERVICE CARD

30 CPS DOT MATRIX TERMINAL

Anderson Jacobson, Inc. announces new lower lease and purchase prices for their AJ 630, a 30 cps dot matrix thermal teleprinter terminal. On a 12 month lease, the AJ 630 is available for $70 per month including maintenance. The new quantity one purchase price for the AJ 630 is $1600 with reduced prices for larger quantities.

The AJ 630 features 10, 15 and 30 cps data throughput; a 15-inch wide, 140 column carriage; quality dot matrix characters with a full upper and lower ASCII character set; last character view; and is a desk top unit. Options for the AJ 630 are an APL character set and keyboard and/or a numeric pad.

Anderson Jacobson, Inc., 521 Charcot Avenue, San Jose, CA 95131 (408) 263-8520.

CIRCLE 237 ON READER SERVICE CARD

12" CRT TERMINAL

Cybernex Limited is announcing the availability of their 12" CRT computer terminals in a new, compact, molded enclosure. The enclosure has been designed to be attractive, rugged and functional. Seven standard models are available from low cost time sharing terminals to microprocessor controlled multi-page block mode and APL terminals.

Cybernex Limited, 2183 Dunwin Dr., Mississauga, Ontario, CA L5L 1X2, (416) 828-2810.

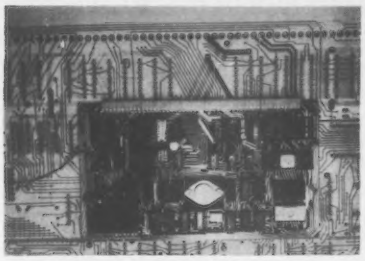
CIRCLE 238 ON READER SERVICE CARD

SS50 BUS DISPLAY BOARD

The PMB-1 is a memory-mapped alphanumeric and graphics display board for the SS50 bus. The board provides: programmability via the processor bus; any display format such as 32 x 16, 64 x 16, 80 x 24, etc.; on-board screen memory in 1k increments up to 4k; versatile addressing scheme; programmable cursor with various formats; blinking or non-blinking; hardware or software scrolling; light pen input and register; on-board I/O port for keyboard, printer, joystick, etc.; standard or custom character sets; upper case, lower case and graphics characters available simultaneously. $37.50.

F & D Associates, 1270 Todd Rd., New Plymouth, OH 45654.

CIRCLE 239 ON READER SERVICE CARD



TRS-80
PERIPHERALS & SUPPLIES

DISK DRIVES $399.00 — **Fully compatible** with Radio Shack drives. **Includes:** ■Power supply ■ case (specify silver or blue) ■4 drive connector cable ■ verbatim diskette with test program and user op. system ■ 60 day warranty ■ complete user instructions.

16K RAM SETS $106.00 — **200NS 16K Dynamic RAM Memory Kit.** NEC chips. Includes jumpers and instructions for installing in TRS-80 keyboard unit or expansion interface. (Specify keyboard or interface.)

VERBATIM DISKETTES $3.30 ea. 10 FOR $30.00 — **These are the top of the line** in diskettes and worth every cent of the $6.00 each that you pay elsewhere.

CENTRONICS-779 LINE PRINTER $1200.00 — **With forms tractor.** This is the same printer that Radio Shack supplies. A 399.00 savings if you buy from us.

TI-810 PRINTER $1995.00 — All set to run on your TRS-80 at twice the speed of the 779.

Send to P.P.S.
P.O. Box 2051, Seal Beach, California 90740
For fast service or information call (714) 894-3736

CIRCLE 175 ON READER SERVICE CARD

VisiCalc™
How did you ever do without it?

CIRCLE 192 ON READER SERVICE CARD

TOOLS

DIGITAL TESTER WITH ICTM-1

ICTM-1 tests all TTL Families, CMOS, NMOS, small boards, performs both functional and parametric tests, test devices with up to 24 pins, interfaces to any host computer via 24 line parallel interface, has direct interface to S-100 systems using the Pragmatic Design's interface board, IF-1, has available high level control language. (TBASIC), and includes aluminum case, universal personality module, complete manual set.

The ICTM-1 digital tester module expands any microcomputer into a complete, computer controlled test system. The host computer provides the "intelligence" of the test system while the peripheral tester provides the precision control and measurement electronics. This approach allows users to multiply the value of their computer investment and obtain extra service from existing computers. $500.

Pragmatic Designs, Inc., 711 Stierlin Rd., Mountain View, CA 94043, (415) 961-3800.

CIRCLE 240 ON READER SERVICE CARD

SOFTWARE

INTEGRATED MICROCOMPUTER ACCOUNTING SYSTEM

An Integrated Accounting Software System for microcomputers is available from Peachtree Software, a division of Retail Sciences, Inc.

The system is organized into four packages—General Ledger, Accounts Payable, Accounts Receivable, and Payroll. Each of the packages may operate in a stand-alone fashion or they may be combined to provide automatic financial reporting.

The software is written in Microsoft BASIC and executes under the CP/M Operating System or equivalent. Hardware requirements include an 8080-compatible processor with 48K of RAM, 132 column printer, video terminal, and a minimum of 0.5 megabytes of online disk storage.

Retail Sciences, Inc., Suite 419, 3384 Peachtree Road, N.E., Atlanta, GA 30326, (404) 231-2303.

CIRCLE 241 ON READER SERVICE CARD

ACCOUNTING SOFTWARE FOR SMALL BUSINESSES

Professional Systems Development has announced a software package for microcomputer systems that represents a completely interactive general business software package designed expressly for the small businessman.

Called the Accounting Software Application Package, ASAP is unlike any other currently available microcomputer software systems; the documentation is of the caliber furnished with large main frame software costing in the tens of thousands of dollars. ASAP has seven subsystems applicable to the general accounting practices of most small businesses: General Ledger, Accounts Receivable, Accounts Payable, Inventory Control, Payroll, Cash Receipts, and Cash Disbursements. The entire package is available only through qualified computer dealers at a retail price of approximately $400.

Professional Systems Development, Inc., 2555 E. Chapman Ave., Suite 411, Fullerton, CA 92631, (213) 271-7924.

CIRCLE 242 ON READER SERVICE CARD

DEBUGGING SYSTEM

Southern Systems of Birmingham announces the release of it's assembly language debugging system RAID, a floating point package and a relocating assembler, REMAC. It is designed as a debugging tool for the 8080. RAID includes more than 60 unique commands which include the usual debug capabilities for setting breakpoints, examining and altering cpu registers, examining and altering memory, etc.

WHY

BE CONTROLLED BY A TIMESHARING SYSTEM WHEN YOU CAN CONTROL A

CLUSTER/ONE?

Clustersharing is . . . several individual computers sharing a large program library, while preserving the individuality of each machine.

The CLUSTER/ONE Concept offers each BASIC user his own computer rather than a small share of one central processor.

Nestar Systems' CLUSTER/ONE creates a new dimension in low-cost computing, combining the power and economy of individual micro-computers with the ability to store and share a million byte source program library on two full-size flexible diskettes.

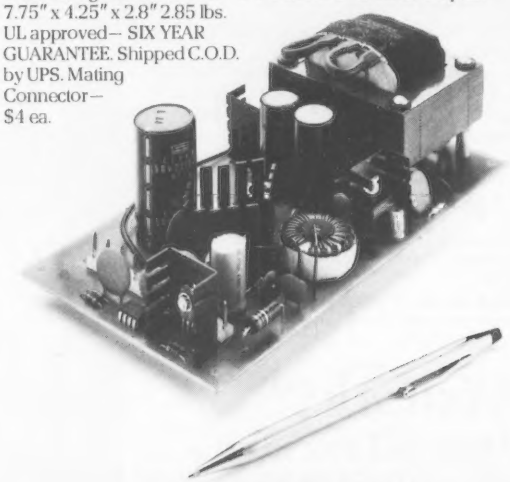
To find out more about CLUSTER/ONE, call us at 415/327-0125. Or write to Nestar Systems, Inc., 430 Sherman Avenue, Palo Alto, California 94306.

NESTAR SYSTEMS INCORPORATED

CIRCLE 172 ON READER SERVICE CARD

MICRO-PROCESSOR POWER SUPPLY.

Don't destroy your expensive electronics with a bargain power supply.—Switching Regulated.—Model 2000, 5V-4A, ±12V −0.3A. Adjustable −2.5V to −12V-0.1A $91. Model 2001, 5V-4A, ±12V-0.3A $86. Regulation ±5% under all conditions. Over Voltage Protection on +5V. Current limit on all outputs. 7.75" x 4.25" x 2.8" 2.85 lbs. UL approved— SIX YEAR GUARANTEE. Shipped C.O.D. by UPS. Mating Connector— $4 ea.



CONVER Corporation

10631 Bandley Drive Cupertino, CA 95014 (408) 255-0151

RAID is available on an 8" diskette for use either under CP/M or under Intel's ISIS-I or ISIS-II operating systems. The CP/M version is $99.95, the ISIS version is $150.00 and both are supplied with complete documentation. The documentation is available separately for $15.00.

An assembly language program, floating-point-processor provides fast decimal arithmetic functions including addition, subtraction, division and multiplication. Mantissa's of up to 12 decimal digits may be used and exponents ranging from -127 to +127 are accepted.

Documentation is available separately for a cost of $10.00 and the FPP object code is available on either CP/M compatible or ISIS compatible 8" diskettes for $49.95.

A macro relocating assembler, REMAC, was written for the 8080. The assembler generates an object module which is fully relocatable (a loader program is included with the REMAC package) and in addition has external linkage capabilities. It also utilizes "local" symbols which are referenced only within a small segment of the program and which are not passed to the master symbol table.

REMAC documentation is available for $15.00, or the entire package is $99.95.

Southern Systems of Birmingham, P.O. Box 3373-A, Birmingham, AL 35205, (205) 933-1659.

CIRCLE 243 ON READER SERVICE CARD

DATA MANAGEMENT SYSTEM

Better Programming Systems announces a complete small business development system based on the BPS data management system. Optional payroll, general ledger and word processing packages provide for the applications sought by small businesses.

One megabyte mass storage, CRT with full-sized keyboard and 125 LPM, upper/lower case high-quality printer are standard. A typewriter quality printer, hard disk, and other terminal specifications can be added. The initial system can be upgraded to 300 megabytes with several data entry and retrieval stations. Thorough program documentation makes customization simple to do.

The BPS runs on an Ohio Scientific Challenger II or III microcomputer and is written in BASIC.

BPS, Inc., 322 West 57th St., New York, N.Y. 10019 (212) 781-1861.

CIRCLE 244 ON READER SERVICE CARD

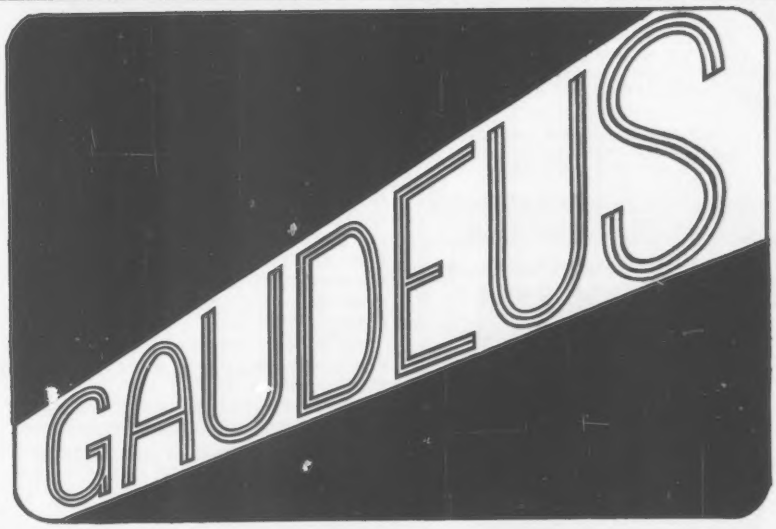
DISC-BASED OPERATING SYSTEM FOR 6800s

CP/68 furnishes big-system features and capabilities for microcomputers; a combination of memory-resident and transient commands provide the system's flexibility. PIP, the Peripheral Interchange Program allows transfer of data between physical devices. Other features of the operating system are:

PET
TRS-80
APPLE II
SORCERER

8 K Bytes Minimum Needed

Please Specify



Gaudeus is a monthly cassette tape with at least ten programs each month with such topics as Home Economics — Business — Trivia — Games — Language (Computer) — also programs in Math, Physics, Geography, Chemistry, Recipes, Speed Reading, and much more. The back of the cassette, besides having recipes, tables or charts, will also have short stories and editorials with speed control so you can train speed reading.

The introductory price is $30.00 per year.

Foreign Orders - Write for Rates

GAUDEUS, Box 113, Ozone Park, N.Y. 11417

CIRCLE 152 ON READER SERVICE CARD

****** TRS 80 DISK BASED BUSINESS SOFTWARE ******

ALL PACKAGES UTILIZE RANDOM ACCESS. EXTENSIVE ERROR TRAPPING, EFFICIENT CODE, FOLLOW-UP ASSISTANCE, USER DESIGNED SCREENS, AND MUCH MORE. WE'RE NOT "CHEAP" BUT WE'RE DE-BUGGED.

INVENTORY	REPORTING INCLUDES SLS, REORDER, 01h, VEN, COST, REC. RANDOM ACCESS BY ITEM # OR BY STOCK #. 100 VENDORS 1400 ITEMS.
GENERAL LEDGER	200 ACCTS + CONTRA (USER DEFINED). TRAIL BAL, P&L, BAL SHEET, JOURNAL LISTING, CHART OF ACCTS. DOESN'T ACCEPT O/B JOURNALS.
PAYROLL	SAL/HRLY INS DED + 2 MISC. FULL REPORTING FICA, STATE, FED, F.U.T.A. 80 + EMPLOYEES.
ACCTS REC	BAL FWD, AGING AND BILLING RPTS. RECORDED BY INV # OR CHECK #. 300 ACCTS.
MAIL/LIST	SORT BY ZIP, NAME, USER CODES. FULL OR PARTIAL PRINTING. 4 LINES N/A. SUPPORTS 900.
GAMES PACK	6 GAMES INCLUDING 80-OUT (BREAKOUT). DISK OR TAPE. TAPE (16K LEVEL 2) DISK (32K RAM)

WHOOPS I'M RUNNING OUT OF ROOM
PRICES: INVEN, G.L., PAYROLL, A/R $265.00
MAIL/LIST 79.95 GAMES PACK $ 39.95
ALSO AVAILABLE JOB COSTING* PAYABLES, AND CUSTOM APPLICATIONS AND FREE UP TO DATE INFORMATION ABOUT NEW AND FUTURE TRS-80 PRODUCTS.

AFFORDABLE BUSINESS SYSTEMS INC.
2101 E. BROADWAY RD., SUITE NO. 11
TEMPE, AZ 85282 TEL.: 602-966-3339

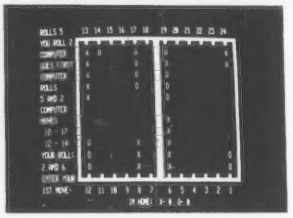
SPEND A DIME AND CALL FOR MORE INFORMATION

CIRCLE 117 ON READER SERVICE CARD

Improve Your Game With

>>> FASTGAMMON >>>

An Exciting New Backgammon Opponent!



>>> FASTGAMMON >>> ON THE TRS-80

Ready to run on your

- TRS-80 (level II)
- APPLE II (16K)
- SOL
- POLY-88
- COMPAL-80

All versions require at least 16K. Apple disk requires 24K. Sol disk North Star only. Compal disk Micropolis dual density only. Poly-88 not available on disk.

OUTSTANDING FEATURES! — Computer makes good moves instantaneously. Literal and graphic displays of each move. Option to replay same rolls. Eight-page instruction manual.

OUTSTANDING VALUES! — Only $20 on cassette or $25 on diskette. California residents add 6% sales tax.

SEE IT NOW AT YOUR LOCAL COMPUTER DEALER OR ORDER DIRECT FROM

Quality Software
10051 Odessa Avenue
Sepulveda, CA. 91343
Dealers: For info call (213) 344-6599

CIRCLE 109 ON READER SERVICE CARD

complete device-independent I/O; sequential and random file access methods; dynamic allocation and expansion of files; command files; chaining and overlaying of user programs; it fits in less than 8k and can be relocated anywhere in memory; extended instruction set includes 19 new 6809-type instructions (PSHX, PULX, etc); all DOS services available through a single Supervisor call; and easily interfaces to new devices and peripherals.

Hemenway Associates, Inc., 101 Tremont St., Suite 208, Boston, MA 02108, (617) 426-1931.

CIRCLE 245 ON READER SERVICE CARD

DISK OPERATING, FILE MANAGEMENT SYSTEM FOR 6800 MICROCOMPUTERS

PerCom Data Company announced the availability of an advanced disk operating and file management system for the 6800 microcomputer. Called INDEX (INterrupt Driven EXecutive), the system executes faster than most disk operating systems because the console and other I/O devices are serviced by interrupt requests instead of by polling.

INDEX is supplied on two minidiskettes together with a users manual. $99.95.

Percom Data Company, 318 Barnes, Garland, TX 75042, (800) 527-1592.

CIRCLE 246 ON READER SERVICE CARD

MICRO APPLICATIONS

Micro Applications has introduced the MICRO PLOT, a set of FORTRAN, COBOL, or Assembly language callable routines which convert any daisy-wheel printer into an incremental plotter. Printers supported include the Qume Sprint 5 and 3000, Diablo Hi-Type I and Diablo Hi-Type II (1610/1620), and the DTC 300A. $295.

They have also introduced a CP/M Expander for $95; a CBIOS for CROMEMCO 4FDC controller which allows for running all CP/M software on all CROMEMCO computers for $50,00; a disk utility package which runs under CP/M or CROMEMCO's CDOS for $50; and, a Blackjack program which instructs the player on the Basic Strategy for $25.

Micro Applications and Hardware, P.O. Box 22212, San Francisco, CA 94122, (415) 664-0778.

CIRCLE 247 ON READER SERVICE CARD

ALLIED PROGRAMS

Universal data entry, universal data edit and sort have proven to be our most useful utility programs. Allied Computer Services is a data processing center and a custom software house that currently renders services to over 50 businesses. The ability to produce inhouse software applications for a particular clients processing need or a custom programming job is vital to our prosperity.

The following programs have been written by Allied Computer Services using UDE, EDIT and SORT: Retail inventory Control, Payroll Update Programs, Deepmine Coal Reserve Estimation, General Ledger Conversion of account structure, Manufacturing Inventory Control, Speed Entry Payroll, United Mine Workers Payroll, Profit Sharing Plan, and Inventory Stratification.

Allied Computer Services, P.O. Box 1700, Huntington, WV 25717, (304) 522-6068.

CIRCLE 248 ON READER SERVICE CARD

MAIL-LIST LOOKUP SYSTEM

HSC Computer Services, LTD., has a name and address system called "The Super-Sort Mail-List and Lookup System" (SMLS). The system runs under CBASIC on CP/M. The system features attention of, company name, street address, room number, city, state, zip code, area code and telephone number, and, selection category code.

Any of the above fields may be sorted for mailings or reports. The system is self teaching and simple to use. It also allows checking for duplicate records in a "spot-check" mode. Disk plus manual $125.

HSC Computer Services, LTD., P.O. Box 43, Brooklyn, N.Y. 11236.

CIRCLE 249 ON READER SERVICE CARD

PAYSOFT

Paysoft is a payroll software system of programs and data files designed to meet the requirements of any small business payroll. A complete recording of all payroll transactions is maintained. Complete summaries of employee pay and withholding history is available in both soft and hardcopy forms. Paychecks are automatically generated and when automatically printed, provide the employer and employee a comprehensive checkstub and paycheck. Various payroll reports are automatically generated and optionally printed for use by the employer in reviewing employee totals and company totals and for maintaining hardcopy records of both.

Paysoft is designed specifically to operate on the TRS-80 microcomputer. Minimum system requirements are: 32K RAM, Level-II BASIC, expansion interface and disk. Paysoft will run on a configuration having only a single disk and no printer. $100.

Ready, P.O. Box 532, Pleasanton, CA 94566, (415) 462-4381.

CIRCLE 250 ON READER SERVICE CARD

INTERACTIVE MICROWARE, INC.

Designed for the hobbyist and software developer, all of IMI's software is designed for 8080, Z80, and 8085 based computers. Current plans are to adapt several programs to run on the popular TRS-80.

IMI's product line includes:

- DOS+ enables any program to execute all North Star Disk and/or Meca Tape commands. It allows batch command lists and other very useful commands.
- PRO-TYPE WORD PROCESSOR
  Easy to learn, PRO-TYPE combines text input, editing and printing in one program. Features include: right margin justification; tabs; paging; underlining; relocation of text blocks, etc. PRO-TYPE only requires 8K of memory.
- BASEX is a new interactive compiler similar to BASIC. It executes programs up to 10 times faster than equivalent programs while requiring about half the memory space. Features include: array variables, string manipulation; arithmetic operations on signed 16bit integers and versatile I/O communication functions.
- BASEX TAPE & DISK GUIDE
  This program allows BASEX to access up to four North Star Disk and/or Meca Tape drives. All operations can be executed from the keyboard.

All IMI programs are available on diskette or tape cassette. They can be obtained on other media upon special request. PROTYPE and BASEX will be available on CP/M 8" media in the near future. Prices begin at $33 for BASEX and range up to $75 for the PRO-TYPE Word Processor,

Paul Warme, Interactive Microware, Inc., P.O. Box 771, State College, PA 16801 or call (814) 238-8294.

CIRCLE 251 ON READER SERVICE CARD

APPLE GRAPHICS PROGRAMS

Hires Graphics Utility Set is a new collection of programs designed to facilitate the use of Apple II computer's powerful high resolution graphics capabilities. The set includes Software controlled character display, which can display lower case, APL, Russian, Japanese, mathematical notations or any characters one chooses, all under software control. Minimum software overhead with fast assembly language routine. Perfect for labeling hires plots. It also has a character set generator and editor, shape vector table assembler and editor, find utility and, a utility to determine what is on the screen at a particular point.

Minimum implementation requirements are 4K Apple II integer Basic and standard hires graphics routines. Tape with manual $9.95.

Soft-One, 315 Dominion Dr., Newport News, VA 23602.

CIRCLE 252 ON READER SERVICE CARD

DISC TEXT EDITOR FOR THE APPLE II

Services Unique, Inc. has released a DOS Text Editor for the Apple II microcomputer. "Edit" was designed to facilitate changes to disk files, but input and output via cassette is also supported. The text editor includes 25 commands and will edit fixed or variable length disc files. System commands allow the user to delete, insert, change, display, add, and print records. String commands facilitate searching and changing part of a record or the entire file. User defined tabs, file concatentation, range, and other commands are also included.

Edit is written in Applesoft II extended BASIC and requires 16K of memory with an Applesoft ROM or cassette only version, otherwise a minimum of 24K is suggested.

Edit is provided on cassette or Apple II diskette, complete with user manual. Price is $16.95 (add $5 if on diskette and state if Applesoft ROM).

Services Unique, Inc., 2441 Rolling View Dr., Dayton, Ohio 45431.

CIRCLE 253 ON READER SERVICE CARD

SMALL BUSINESS ACCOUNTING SYSTEM

Ohio Scientific announces the availability of a new disk-based small business accounting system, OS-AMCAP, which provides a full accounting bookkeeping system where larger systems are uneconomical.

As an easy to use, turnkey business system, OS-AMCAP is furnished on three 8" floppy disks, and may be used on any Ohio Scientific 6502 based system with 48K of RAM and at least a dual-floppy capability.

The system has been planned for compatibility with the business environment featuring a self-starting (self-booting) design and incorporates interactive conversational prompts in the language of the end-user.

OS-AMCAP features variable allocation capability, which allows the business user to select the amount of memory space to be reserved for the various working files (Accounts Receivable, Accounts Payable, Inventory and Payroll) limited only by disk storage availability.

It also provides a comprehensive General Ledger package and a Billing/Invoicing module. The Billing/Invoicing system will support an imbedded Customer Files program, if desired. The General Ledger module will provide a complete chart of accounts, Cash Receipts/Disbursements, and account balancing features. All modules are fully interactive through a common data-base, and provide easy-to-read reports.

Ohio Scientific also has a support demonstration disk for training or educational operations. $975.

Ohio Scientific, 1333 Chillicothe Rd., Aurora, Ohio 42202, (216) 562-3101.

CIRCLE 254 ON READER SERVICE CARD

Introducing HDS SOFTWARE

For the Apple II

HDS-1 Our **complete** system for database creation, manipulation and retrieval. Machine language routines allow lightning-fast retrieval of information based on a virtually unlimited number of criteria. Fits in 16K, requires DOS $100.00

HDS-2 Adventure in a maze! You search a monster-ridden maze of rooms, corridors and chambers in quest of magical items (and the way out!)
16K tape version $15.00
32K DOS version $30.00

MUCH MORE! Send for free catalog. Send your check plus $1.00 shipping and handling per order (Calif. residents add 6% sales tax) to:

Holistic Data Systems, Inc.
2210 Wilshire Blvd.
Suite 446
Santa Monica, CA 90403
(213) 450-6192

CIRCLE 153 ON READER SERVICE CARD

MICROPOLIS

The Mailing Label Program is an application program for the Micropolis Metafloppy Disk Systems. In addition to the address, you may enter a line of information and three variables that are user defined. The program can handle 1000 names per diskette. The output options allow for sorting by the last name or company name, zip code and a user defined variables.

In the ML version, the sort will take from 1 to 20 SECONDS, depending on the number of records being sorted. The BL version of the sort takes between 10 seconds and 15 minutes.

An extensive error handling routine assures practically error-free operation. All messages are documented in a 20 page user's guide.

ALSO AVAILABLE, a Machine Language Sort Utility. The utility is designed to be easily interfaced to YOUR BASIC programs. The sort is 100 times faster than the best written BASIC sort.

Available to be shipped immediately upon receipt of your order and payment (money order, cashier's check, Visa or Master Charge). A shipping charge of $2.00 will be added to all orders. California residents, please add 6%.

COMPLETE USERS MANUAL	$10.00
MAILING LABEL (ML)	79.50
MAILING LABEL (BL)	39.50
MACH. SORT UTILITY	59.50

IN DEVELOPMENT:
A RESTAURANT PAYROLL PACKAGE

COMPUTER SERVICES
P.O. BOX 15643
San Diego, CA 92115
(714) 438-9137

CIRCLE 188 ON READER SERVICE CARD

HOME

POISON

CONTROL

Roger O. Litge, MD

WARNING: your home contains products which **MAY BE HARMFUL OR FATAL IF SWALLOWED.** This North Star **BASIC** program determines the necessary **EMERGENCY MEASURES** for ingestion of household products. Disk utility allows expansion of substance vocabulary to over 2400 names. Access time less than 6 seconds. Free annual updates. Complete Source listings.

Diskette and Manual $28.00
Manual only, with listings 8.00

WATCH FOR cassette versions.
Available at your computer store or from:

Berkeley Medical Data Associates, Inc.
Microcomputer Consultants
P.O. Box 5279, Berkeley, CA 94705
(415) 653-6707

CIRCLE 121 ON READER SERVICE CARD

THE PATIENT PROFESSOR™

TURNS YOUR
APPLE II
INTO A
TRUE
TEACHING MACHINE

FREE LIST OF
EDUCATIONAL PROGRAMS
AT YOUR COMPUTER STORE

"IT'S WHAT'S INSIDE THAT COUNTS!"

innerglo™

SOFTWARE DIVISION
P.O. BOX 622
24692 BELGREEN PL.
EL TORO, CA 92630
(714) 586-2246

CIRCLE 108 ON READER SERVICE CARD

DATA BASE MANAGEMENT SOFTWARE

PerCom Data Company has announced the availability of a general purpose data base management program for 6800 microcomputers using PerCom's LFD-400 mini-floppy disk systems.

Written in PerCom Super BASIC, and called FINDER (File INformation on Disk for Easy Retrieval), the program allows users to define and access the items of data bases using their own terminology, and to customize file structures to their particular requirements.

All ordinary FINDER functions may be accomplished with only five commands: NEW, CHANGE, DELETE, FIND and PACK. However, up to three user-defined commands may be added. $99.95.

The program may be purchased from PerCom Data Company, 318 Barnes, Garland, TX 75042, (214) 272-3421.

CIRCLE 255 ON READER SERVICE CARD

SPDES—NORTH STAR

Kask Labs announced the program SPDES written in North Star BASIC and is available on a single density North Star diskette. This is an inter-active program used for the design of small signal RF transistor amplifier circuits.

Given the two port scattering matric measured at a single frequency and at a given DC bias level of operation, this program will compute stability factor; if stable, maximum gain, optimum load and source refection coefficient, convert refection coefficient to impedances, single frequency mirco-stripline matching network for the device with a resistive load and source impedance; if potentiality unstable, the parameters of the source and load stability circle, for a specified gain, the parameters of the gain circles.

Kask Labs, 1207 E. Secretariat Dr., Tempe, AZ 85284, (602) 831-1420.

CIRCLE 256 ON READER SERVICE CARD

FILE HANDLING UTILITY FOR CROMEMCO CDOS

Cromemco owners can handle disk directories and files easier and faster with the 11 utilities on the Gunn Utility Disk No. 1. This new machine language utility package, used with CDOS, permits doing things with Cromemco systems that were impossible before.

The new Gunn utilities will perform the following tasks: alphabetize diskette directories, create .CMD files from directory to allow transferring or outputting selected file groups quickly and easily to any device, isolate bad diskette clusters into bad-cluster directory entries to keep them from interfering with diskette space allocation beyond the bad area, recover/display erased directory entries, map on console or printer the diskette clusters occupied by all or any selected file or group of files, permit jumping to and executing programs at a hex address, provide current date (month, day of month, year) for easy use by any program with file access capability, automatically eject diskette from selected drive(s) when desired, cold boot from diskette in drive A, output preselected number of form feeds to the printer, set Diablo 1620/Qume Sprint 5 printer margin and paper movement parameters from the console, and suspend system operation at selected program points to allow positioning cut paper in printer. 8" disk and manual, $95.

Comput-R-Ware, Div. Ken Kirkpatrick Advertising Inc., 7910 Westglen, Houston, TX 77063, (713) 780-9342.

CIRCLE 257 ON READER SERVICE CARD

CROMEMCO RATFOR WITH FORTRAN IV

Cromemco RATFOR is a structured language preprocessor for FORTRAN IV. Cromemco RATFOR receives, as input, a program written in RATFOR and outputs a program written in Cromemco FORTRAN IV which can be compiled with the Cromemco FORTRAN compiler.

The FORTRAN output of Cromemco RATFOR has been made as readable and useable as possible for the user who would like to modify it. Thus, RATFOR allows two levels of program development, the RATFOR programs and the FORTRAN programs resulting from preprocessing.

Hardware requirements for RATFOR are a Cromemco Disk System with two disk drives and 48K of memory.

Cromemco RATFOR, which includes both a complete RATFOR and a complete FORTRAN package, is available for $195 on 5" disk (Model FDR-S) or 8" disk (Model FDR-L).

Cromemco, Inc., 280 Bernardo Ave., Mountain View, CA 94043, (415) 964-7400.

CIRCLE 258 ON READER SERVICE CARD

INTERACTIVE DATA MANAGER

IDM-III provides a general purpose, interactive, simple, but yet powerful solution to database management for the TRS-80 DOS system. IDM-III allows many applications to be computerized without any programming. The basic components of IDM-III are data base initialization, data base manipulation, report-formatter, and report-generator.

The features include interactive conversation requires no user programming and no commands to remember; no limit in the number of fields; specify the name of the field, the type (string or numeric), and the size on-line; key random access method & sequential access method; blocking, hashing, and special buffering technique; multiple sort fields; powerful report-writer requires no user programming; field calculations include totals, averages, multiply, divide; report can be printed or displayed on the screen page by page; and, powerful report-writer lets you select fields and filter criteria. $49.

Micro Architect, 96 Dothan St., Arlington, MA 02174.

CIRCLE 259 ON READER SERVICE CARD

TRS-80 OWNERS

AVAILABLE FOR IMMEDIATE DELIVERY

CASSETTE SOFTWARE DISKETTE

Package # 1036 (Level II) $495.00

COMPLETE SMALL BUSINESS – This program is a complete small business program that was tailored to work for most small business applications. The program includes such things as Accounts Receivable, Accounts Payable, Invoicing, Inventory Control, Payroll and General Ledger.

Package # 1038 (Level II) ..... $ 99.95
ACCOUNTS RECEIVABLE

Package # 1039 (Level II) ..... $ 99.95
ACCOUNTS PAYABLE

Package # 1044 (Level II) $125.00
INVENTORY CONTROL

Package # 1045 (Level II) ..... $ 99.95
INVOICING

Package # 1046 (Level II) ..... $ 99.95
PAYROLL

Package # 1047 (Level II) ..... $ 99.95
MAILING LIST

Package #1024
(Level II, DISKETTE) $24.95
Includes the following:
SPACEWAR I – BANNER – UFO ATTACK – PILE UP – BIORHYTHM – AUTO RACE and WORDS.

Package #1026
(Level II, DISKETTE) $24.95
Includes the following:
SPACEWAR II – CIVIL WAR – TRAP THE TRIBBLE – LIFE – KNIGHT – CONCENTRATION and LUNAR LANDER.

OVER 150 EXCITING PROGRAMS

★ MORE EVERY DAY ★

EDUCATION ELECTRONICS MARKETING

Also available for PET and APPLE.

All SOFTWARE-80 programs are guaranteed.

Programs available in Level I and Level II Basic.

All of our business programs will operate with printer; custom programs also available.

With certified check or money order, all orders shipped within 24 hours.

Personal checks allow 2 weeks. Send for our complete catalogue.

SOFTWARE-80

18228 Cabrillo Court
Fountain Valley, CA 92708
(714) 962-0104

ALL PRICES AND PROGRAMS ARE SUBJECT TO CHANGE WITHOUT NOTICE

CIRCLE 203 ON READER SERVICE CARD

Announcing
the First Business Journal for Microcomputers . . .

BusinessComputing Review

At last, you can learn about Business Software and Systems *before* you buy.

BusinessComputing Review provides in-depth research reporting into business systems and software currently available.

BusinessComputing Review presents the necessary information for businessmen and professionals to plan the installation and use of a microcomputer system. The concise review format simplifies the selection based on business requirements.

BusinessComputing Review reports to you results from extensive testing of software and systems. Opinions expressed are free from the influence of commercial interests because Business Computing Review is supported without advertising.

BusinessComputing Review is published six times annually, and is available only to subscribers. Subscription price is $25 in the US, Canada, and Mexico. International Subscriptions are $30.

BusinessComputing Review
BusinessComputing Press
Post Office Box 55056
Valencia, CA 91355

CIRCLE 123 ON READER SERVICE CARD

CP/M* SPOOLER

SPOOLER is a complete spooling system, not just a background utility. It intercepts list output, spools it to disk, then prints during I/O operations and unused computer cycles.

SPOOLER features include:

- Parallel processing without interrupt.
- Operates in 1K of memory above CP/M.
- Can be suspended and restarted.
- Concatenates all list files without overflow.

SPOOLER is compatible with most standard CP/M systems and greatly increases throughput. **Price $70**

SPOOLER is a copyright 1978 product of:

K L H SYSTEMS
18101 Carolyn Circle
Villa Park, Cal. 92667
714-997-4365

Call or write for additional information

*CP/M is a trademark of Digital Research

CIRCLE 159 ON READER SERVICE CARD

PET SOFTWARE

Home Computer Centre announced the following programs:

Entry is used as a general purpose data entry program for business applications with user definable entry format, the program may be used for a Mail List, Daily Journal, General Ledger, Record Keeping etc. It works with cassette printer, and other IEEE devices.

Process is a general purpose data process program. It is designed for limited data processing power on the PET. Basic operation includes SORT, EDIT, DELETE, INSERT, and MACRO. The program is particularly useful for merging large amounts of data from different input sources.

DCE Text Editor and Formator is the most powerful word processor package we have seen on the PET. Full use of the screen editor includes all cursor movements with repeatable cursor. Data is exactly what you see on the screen, pages may be scrolled up and down. Output margins and justification user definable. Programs are written in machine language, 4K bytes free for user text data.

Inventory - Inventory control program on the PET Data includes, item #, description, quantity on hand, reorder limit and prices. It generates inventory report and low inventory report. Handle up to 60 items on the 8K PET. Data may be insert, delete, change, on the memory instantly.

All of the programs sell for $24.95.

Home Computer Centre, 6101 Yonge St., Willowdale, Ontario M2M 3W2, CA (416) 222-1165.

CIRLCE 260 ON READER SERVICE CARD

RENTAL INFORMATION AND INCOME PROGRAM

RIIP is designed for the property owner or manager who rents property on a monthly basis, providing background information on each rental and complete income tracking.

Rental-Information for each unit includes up to three names, four phone numbers, date rented, rent and deposites. This information along with income tracking data is stored on cassette and can be recalled and displayed on screen at any time by selecting a one to five character rental code. This information can easily be changed, added to or deleted using the systems input - editing facilities. Income-Information for each rental including regular monthly payments, partial payments and year-to-date totals are tracked and maintained on file.

RIIP is available on cassette with complete documentation for the TRS-80 Level II and Apple II (Applesoft) Micro Computers. RIIP uses 7K of memory and 1K of memory for every 8 rental units. (a 16K system will handle 75 rental units with debounce). $25.

Realty Software Co., 2045 Manhattan Ave., Hermosa Beach, CA 90254.

CIRCLE 261 ON READER SERVICE CARD

MAILING/FILE PROGRAM FOR TRS-80

Tarzac/Computer Products announces the Ultimail Disk Based Mailing/File Label Print Program. It utilizes Sequential Disk Files and operates under all versions of TRSDOS. Ultimail can pack 1,000 Files on a System Disk in a one drive system, depending upon the available RAM. Minimum RAM required is 32K. Ultimail exclusive features include HAL Program Monitor System, user-controlled spacing between printed labels, and user-controlled print quantity. Labels are three line and are printed in ascending Zip Code order. Ultimail is fully self-protecting and interactive with the user, and Ultimail has extensive EDIT and ADDITIONAL FILES routines, and uses variables to NAME, SAVE and LOAD Files. $55.00.

Tarzac/Computer Products, Box 10203, Norfolk, VA 23513, (804) 893-2304.

CIRCLE 262 ON READER SERVICE CARD

PERSONAL PROGRAMS

Aladdin Automation has announced the first two releases of Personal Programs. The first consists of eight programs: Math-Ter-Mind, Lunar Lander, Craps, Jungle Island, Mastermind, Stix, Tic-Tac-Toe, and Super Pro Football. The second also consists of eight programs: Personal Finance, Home Management, Stox, the Psychologist, Tank Battle, Multiplication Cave, Star-Ship Enterprise, and Aladdin's Arabian Nights.

Each of these first sixteen programs from Aladdin Automation are designed for the TRS-80, PET 2001, and APPLE II personal computers.

Aladdin Automation, 3420 Kenyon St., Suite 131, San Diego, CA 92110.

CIRCLE 263 ON READER SERVICE CARD

SLIC

SLIC, a high-level structured language for personal computers, combines the simplicity of BASIC with the clarity of expression of structured languages like C and Pascal. Unlike compiler languages, SLIC is designed for interactive program development. SLIC also provides an ideal way to learn the modern techniques of top-down design and structured programming.

Among SLIC's features are: GOTO statements eliminated for clearer code, three types of loops (while, repeat-until, for), generalized if-else with statement grouping, functions with arguments (similar to FORTRAN subroutines), unlimited length character strings, and extended-precision math functions.

TAPE SLIC is available in either TRS-80 or Tarbell cassette formats for $50. DISK SLIC is available for CP/M users at $95. Prices include a self-teaching user's manual, which may be ordered separately for $10.

RTG Data Systems, 1003 Wilshire Blvd., Suite 202, Santa Monica, 90401, (213) 451-3662.

CIRCLE 264 ON READER SERVICE CARD

MATH DRILL PROGRAM

In 1977-78, Dallas Public Schools began to systematically adapt their math curriculum for use on the TRS-80. The lessons are correlated with all the major math basal series. The program includes strands on addition, subtraction, multiplication, division, numeration, fractions, decimals and other parts of the curriculum for grades K-8. The TRS-80 needs a slight modification, included with the tapes, to run the program. The complete program costs $995; teacher's manual $5.

Foundation for Quality Education, Inc., 802 Merchants State Bank Bldg., 5217 Ross Ave., Dallas, TX 75206, (214) 827-9060.

CIRCLE 265 ON READER SERVICE CARD

PET PILOT

Commodore PET owners get full standard PILOT on a minimum size PET. Also there is an Editor suitable for preparing long programs of up to about 80,000 characters.

The new product features full BASIC in compute statements as well as two new keywords designed to make PILOT programming easier and faster. All language features of the most recent PILOT standard are implemented. In addition, the system has been designed to be easy to learn and use. Because PET tapes can only move forward, there are limits, depending on memory size, to the distance a PETPILOT program may jump upward.

Only the tape drive supplied with the PET is required to run any PETPILOT program. While simple PETPILOT programs can be created on a one tape PET, authors writing long programs will need the second cassette drive offered by Commodore International of Palo Alto, CA, manufacturer of the PET.

The package offered by the PETPILOT Project contains both programs, a sample PETPILOT program, a teacher's manual, a quick reference card, and licenses to run the programs on a single PET. A tutorial course of two one hour lessons in effective use of PETPILOT is also available. The basic package costs $12, the tutorial is an extra $8. Both products can be ordered by specifying the PET serial number to be licensed to Dave Gomberg, 7 Gateview Court, San Francisco, CA 94116.

CIRCLE 266 ON READER SERVICE CARD

EDUCATIONAL SOFTWARE

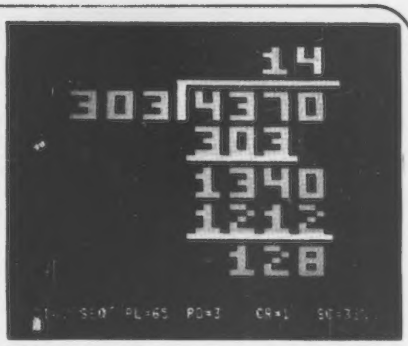
Thirty CAI packages have been developed in areas such as reading, writing, spelling, arithmetic and mathematical skills for elementary school students. Written in BASIC for ease of implementation, the packages sell for an average price of $150.00 each.

Resource Software International, Inc., 140 Sylvan Avenue, Englewood Cliffs, N.J. 07632, (201) 947-6104.

CIRCLE 267 ON READER SERVICE CARD

MATH DRILL SEQUENCES

An extensive amount of research (and money) went into the development of math strands by Dr. Patrick Suppes and his team at Stanford in the 50's and 60's. Now these strands (or sequences) have been modified to run on the Apple, PET and TRS-80.



The program consists of the following sequences: addition (100), subtraction (57), multiplication (61), division (65), laws of arithmetic (23), negative numbers (38), fractions (49), decimals (71), and percents (15). The program is designed for schools but can be purchased by anyone.

Milliken Publishing Co., 1100 Research Blvd., St. Louis, MO 63132, (314) 991-4220.

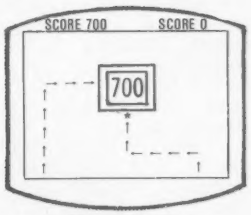
CIRCLE 268 ON READER SERVICE CARD

KISS-KOMPUTOR INTEREST SLECTING SURVEY

KISS is a money-making project for school computer classes. A 16K machine can process over 400 surveys having 20 responses each . KISS generates excitement via computer dating simulation. The program is written in TRS80 Level II Basic; but adaptable to any string capable Basic. Anticipate netting $100 per survey (enrollment 350). KISS listing, documentation, sample survey forms, and administration instructions available for $7 from:

David Bohlke, North Linn Dr., Coggon, Ia. 52218

NEW **TRS-80 LEVEL II 16K** NEW



VIDEO DISPLAY

WHEREAMI ?

A DUMB NAME FOR A GAME?

EACH PLAYER TRIES TO GET TO THE BOX FIRST AND SCORE THE POINTS. BOXES APPEAR/DISAPPEAR AND REAPPEAR IN DIFFERENT LOCATIONS. IF YOU'RE STILL TRYING TO HIT A BOX AND HAVEN'T HIT A BORDER, YOUR OPPONENT, OR YOURSELF, YOU MAY FIND YOURSELF LOST IN A MAZE OF ARROWS AND SCREAMING **WHEREAMI ?**

A NERVE BREAKING GAME FOR TWO

SEND ORDERS TO:
©1979 MICRO-FANTASTIC PROGRAMMING
P.O. BOX 2307, GRAND CENTRAL STATION, NEW YORK, NY 10017

$10.95

CIRCLE 166 ON READER SERVICE CARD

TRS-80 COMPUTING

non-profit newsletter
$15 (U.S.)/12 issues payable

and now

PEOPLE'S SOFTWARE

at Popular Prices
25¢ per program + $1 tape
Tape 1 includes 26 Level I
business/home/educational
just $7.50 + 50¢ P. & H.
(CA residents add 45¢ tax)

Computer Information Exch., Inc.
Box 158
San Luis Rey, CA 92068

CIRCLE 130 ON READER SERVICE CARD

TRS-80 disc software

WORD PROCESSOR Avoid work processor converted from other system. Hard to load object file & cannot store text in disk. Ours is specifically designed for the TRS-80. Written in BASIC. No special hardware and text limit. $39.

INVENTORY While others use inefficient sequential file, we use 9-digit key for fast on-line random access. Reports give order info, performance summary, etc. $39.

MAIL print report & labels sorted by any field. Random access, special buffering technique. $35

DATA BASE MANAGER You can maintain a data base & produce reports without any programming. Define fields, types, screen & report formats on-line. Almost use up the required 32K memory. $49.

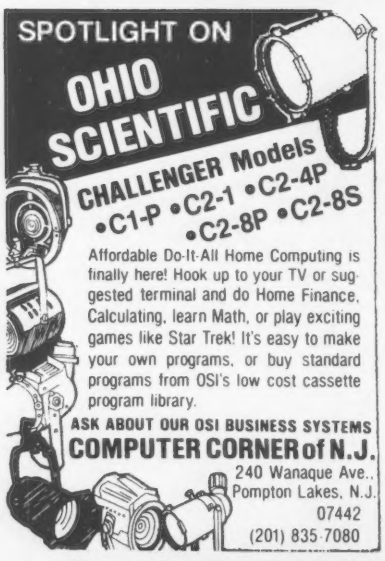
KEY RANDOM ACCESS UTIL hashing, blocking, buffering, auto I/O error retry. Put your disk into optimal use. $19.

ACCOUNT manage client accounts & account receivable. Remark fields for general use. Automatic billing & transaction recording. 32K req. $59.

Full documented. Fast delivery. Our competitors offers $99 cassette word processor, $90 'on memory' inventory, inflexible mail system, 16K data base.

MICRO ARCHITECT
96 Dothan St.,
Arlington, MA 02174

CIRCLE 196 ON READER SERVICE CARD


SPOTLIGHT ON
OHIO SCIENTIFIC
CHALLENGER Models
•C1-P •C2-1 •C2-4P
•C2-8P •C2-8S
Affordable Do-It-All Home Computing is finally here! Hook up to your TV or suggested terminal and do Home Finance, Calculating, learn Math, or play exciting games like Star Trek! It's easy to make your own programs, or buy standard programs from OSI's low cost cassette program library.
ASK ABOUT OUR OSI BUSINESS SYSTEMS
COMPUTER CORNER of N.J.
240 Wanaque Ave.,
Pompton Lakes, N.J.
07442
(201) 835-7080

CIRCLE 110 ON READER SERVICE CARD

DATA BASE MANAGEMENT SYSTEM

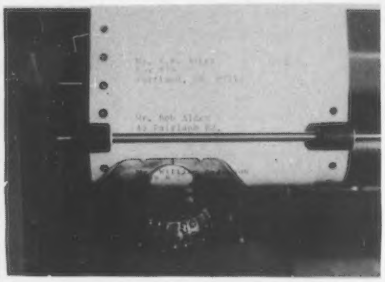
Cromemco's Data Base Management System is a software package which can be used for general ledgers, mailing lists, inventory control, order entry, and a wide range of important business applications. The DBMS uses a powerful multi-keyed indexed sequential access method of organizing the data base so that information can be retrieved quickly and easily.

The DBMS does not require user programming and includes operator-oriented prompts from the screen. To create a data base an operator simply specifies the field attributes and then specifies the methods by which the data can be retrieved (e.g., by state, by name, by state by city by name, etc.).

The DBMS is a disk-based system designed to run on Cromemco System Two or System Three computers with at least 48K of memory. The DBMS is available on 5" diskette (Model DBM-S) and on 8" diskette (Model DBM-L) for $95.00.

Cromemco, Inc., 280 Bernardo Ave., Mountain View, CA 94043, (415) 964-7400.

CIRCLE 269 ON READER SERVICE CARD



MAILING LIST PROCESSOR

MAILOUT, a mailing list processor, includes seven modules: BUILD, SORT, LIST, UPDATE, EXTRACT, LETTER and HELP. The SORT module sorts addresses on zip or address/title. MAILOUT merges or extracts sub-files based on codes stored with address, prints envelopes or labels in one or more columns, and processes letters against mailing lists. Label size is user-controlled. $6.00 for user's manual or $75 for complete program with disk and source code. It is available in three versions: Microsoft BASIC version, Commercial CBASIC and Radio Shack TRS-80 version.

Center for the Study of the Future, 4110 N.E. Alameda, Portland, OR 97212 (503) 282-5835.

CIRCLE 270 ON READER SERVICE CARD

BPS PAYROLL

Better Programming Systems has added payroll to the BPS. Employees' demographics, payroll deductions for withholding taxes and contributions, personnel benefits, allowances, and vacation entitlement, plus employee pay type - salaried, contract, commission, hourly, or piece worker, is carried in the system. Provision is made to accomodate one-time deductions and overtime compilations. Year-to-date and quarter-to-date gross pay and deductions are accumulated by category. Additional elements can be added to customize individual applications. Payrolls are computed for weekly, bi-weekly, semi-monthly and monthly pay periods. The BPS Payroll runs on an Ohio Scientific 48K Challenger II or III microcomputer. $500.

BPS, 275 Fort Washington Ave., New York, N.Y. 10032, (212) 781-1861.

CIRCLE 271 ON READER SERVICE CARD

NEW WORD PROCESSOR FOR TRS-80

The Peripheral People have recently introduced a new concept in word processing programs for TRS-80 single or multiple disk based systems. The Electric Secretary was written in basic to permit user customization and requires a minimum memory of 32K.

In addition to rapid file access, the Electric Secretary provides a hyphenating dictionary. Long words at the end of a line need not produce large gaps in the text. When this might occur, the TRS-80 asks the operator to hyphenate the word. The word is then stored in the dictionary with correct hyphenation points and the text is printed, hyphenated and justified.

File coupling permits lengthy manuscripts to be prepared without overloading memory. The program is ideally suited for the automatic generation of form letters. Address lists and form letters can be cross coupled so that no operator intervention is required. The operator can insert text during printout if desired.

In applications where "boiler plate" paragraphs must be added to manuscripts and letters, the operator can call up any number of standard files. Exclusive features include an echo routine to permit the printer to be used as an electric typewriter and an upper case shift lock (when TRS-80 is modified for upper/lower case). $75.

The Peripheral People, Box 524, Mercer Island, WA 98040.

CIRCLE 272 ON READER SERVICE CARD

MINI-DISK STORAGE

Percom Data Company announced the availability of new software to upgrade TRSDOS, Radio Shack's disk operating system for their TRS-80 microcomputer, so that TRSDOS may be used with 40- and 77-track mini-disk storage systems.

Called PATCH PAK #1, and supplied on mini-disk, the software upgrade also improves TRSDOS by solving the problem of interference of disk operations, and eliminating the disk drive motor stopping prematurely during operation. $19.95.

Percom Data Company, 211 N. Kirby, Garland, TX 75042, (214) 272-3421.

CIRCLE 273 ON READER SERVICE CARD

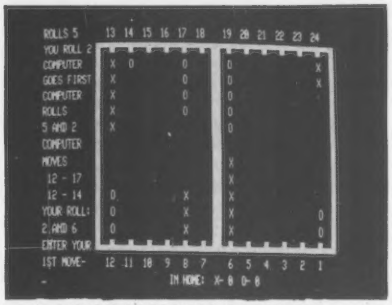
FINANCE PACKS

National Software Marketing Inc. announces the release of six more Inflation Beaters products for the Radio Shack TRS-80 computer. The six new packages are all finance packages. Finance Pack-1 contains three financial programs. The first computes bond interest for earned interest and for yield to maturity. The second program computes effective interest rates. The third computes true interest rates on an installment account. This package sells for $12.95, including shipping and handling.

Nine other packages are available for computing financial information on mortgages, present and future values, analyzing stock and bond market investments, calculating depreciation, discounts, and retail markups. Packages cost between $10 and $22 each.

National Software Marketing Inc., 4701 McKinley St., Hollywood, FL 33021, (305) 625-6062.

CIRCLE 274 ON READER SERVICE CARD


ROLLS 5
YOU ROLL 2
COMPUTER GOES FIRST
COMPUTER ROLLS 5 AND 2
COMPUTER MOVES
12 - 17
12 - 14
YOUR ROLL: 2 AND 6
ENTER YOUR 1ST MOVE-
13 14 15 16 17 18 19 20 21 22 23 24
12 11 10 9 8 7 6 5 4 3 2 1
IN HOME: X- 0 O- 0

A BACKGAMMON-PLAYING PROGRAM

Fastgammon is the name of a backgammon-playing program now available for several home computer systems, including TRS-80 and Apple. The name Fastgammon was chosen because the computer's decision-making is very fast, usually less than a second per move. This is due to the fact that Fastgammon is programmed entirely in machine language.

Fastgammon displays a backgammon board on the video screen. The computer rolls the dice and displays the roll. The player inputs his or her moves and watches as the men move from point to point on the board. Then the dice are rolled for the computer and the computer responds with its move. The left hand edge of the screen is reserved for alphanumeric data and allows the player to review the computer's last move as well as his own. The price is $20 on cassette or $25 on diskette. An easy-to-read, eight page booklet is included that contains the rules of backgammon, the specific instructions for inputting to the program, and some tips on improving your game.

Fastgammon is produced and distributed by Quality Software, 10051 Odessa Ave., Sepulveda, CA 91343, (213) 368-4292.

CIRCLE 275 ON READER SERVICE CARD

M6800 COMMERCIAL BASIC

Microsoft BASIC has been released in a new M6800 version. All of the features of the 8080 BASIC have been implemented, including error trapping, edit mode, random access files, renumbering, 16-digit accuracy, full PRINT USING, and IF/THEN/ELSE. $50-$150.

Microsoft, 10800 NE Eighth, Suite 819, Bellevue, WA 98004, (206) 455-8080.

CIRCLE 276 ON READER SERVICE CARD

STUDENT ENROLLMENT

This Student Directory package maintains an up-to-date list of all students enrolled in school. In addition, the system also prepares a listing of all students by teacher, grade, and sex. Written in BASIC on Hewlett Packard hardware, the package sells for $150.00, and includes documentation, source and media.

Resource Software International, Inc., 140 Sylvan Avenue, Englewood Cliffs, N.J. 07632, (201) 947-6104.

CIRCLE 267 ON READER SERVICE CARD

Welcome to an astonishing new experience! **ADVENTURE** is one of the most challenging and innovative games available for your personal computer. This is not the average computer game in which you shoot at, chase, or get chased by something, master the game within an hour, and then lose interest. In fact, it may take you more than an hour to score at all, and will probably take days or weeks of playing to get a good score. (There is a provision for saving a game in progress on tape.)

This game was inspired by the huge Adventure game which has appeared on large mainframe computers the last several years. But there are important differences. Not only will **ADVENTURE** fit into a relatively small computer, but the 'interpreter' is designed so that different Adventures can be created by changing the data base. So look for more Adventures in the future...

In playing the game, you wander thru various 'rooms' (locations), manipulating the objects there to try to find 'treasures'. You may have to defeat an exotic wild animal to get one treasure, or figure out how to get another treasure out of a quicksand bog. You communicate thru two-word commands such as 'go west', 'climb tree', 'throw axe', 'look around'.

Playing **ADVENTURE** requires logic, ingenuity, and patience. A few hints might be in order for the novice:

As you go in search of treasures, be inquisitive and try to use the objects you see. Usually most objects must be used to get a perfect score (100%). You are allowed to take a limited number of objects with you from location to location.

There are more than 30 'rooms' or locations, so if you find yourself wandering around in circles in only a few rooms, note that the phrase 'obvious exits' implies that some rooms have other exits. But you won't find them until you do the right things to the right objects.

If you're completely stuck, typing HELP will give several different hints, depending on where you are and maybe even on what you're carrying.

You might want to draw a map, however, note that some of the paths may be one-way.

Most important, think, try things, use your imagination, and have fun.

Each ADVENTURE tape or disk contains TWO complete adventures:
1. ADVENTURELAND
2. PIRATE ADVENTURE

ADVENTURE was created by Scott Adams and is produced and distributed by **CREATIVE COMPUTING**. It is currently available for the TRS-80 Level II 16K (Cassette order no. CS-3003, $14.95) and 48K Microsoft Basic under CP/M (Disk order no. CS-9003, $17.95). [24K PET and Apple versions will be available shortly. Watch CREATIVE COMPUTING for announcement].

To order, send payment plus $1.00 postage and handling to Creative Computing, P.O. Box 789-M, Morristown, N.J. 07960. Visa, MasterCharge and American Express card orders accepted by mail, or call toll-free to:

800-631-8112

(In N.J., call 201-540-0445)

Play a little Sol® Music.

It's not really a piano, of course. But a Sol® small computer system can bring music to your ears as it gives you a strong handle on your business.

Priced from $2500 to $10,000, these are full business systems in every sense — working tools to keep you on top of all that paper work.

Play a little Sol music at our store. Compare Sol to other small computers. We'll show you how much more a Sol system can do for you.

Phone us today. You'll be happy you did.

the computer corner

White Plains Mall, 200 Hamilton Ave.
White Plains, N.Y. 10601
(914)WHY-DATA.

CIRCLE 129 ON READER SERVICE CARD

STATISTICS PACKS

National Software Marketing, Inc. announces the release of five more Inflation Beaters products, designed to run on the Radio Shack TRS-80 computer. Statistics Pack-1 has two modules. The first, Linear Regression, reads a distribution of paired values mean of x and mean of y, the standard deviation of x and y, and an expected value of y for any given x. The other module, Correlation, reads in pair x-y values provided by the user. The output in a report contains paired values, correlation coefficient, observation count, mean variance, and standard deviation of x and y.

Four other statistical packages are available for computing other standard and not-so-standard statistical measures. Prices are around $12 each.

National Software Marketing Inc., 4701 McKinley St., Hollywood, FL 33021, (305) 625-6062.

CIRCLE 277 ON READER SERVICE CARD

MAILIST FOR POLY 8813

PolyMorphic Systems has released a Mailist package for the System 88. Mailist lets the user organize the information according to the requirements of the specific mail list. For example, if overseas addresses are common to the list, then the user may want to allow a special entry for province, country, and/or mail codes. In addition, the Mailist entry format may be organized to store specific data associated with the mailing name and address, which may never appear on the actual mailing label.

The Mailist package includes a step-by-step manual with examples. Mailist is designed for a 2 drive, 32K, System 8813.

PolyMorphic Systems, 460 Ward Dr., Santa Barbara, CA 93111, (805) 967-0468.

CIRCLE 278 ON READER SERVICE CARD

NORTH STAR HORIZON USES PASCAL

North Star Computers, Inc. announced that Pascal is available for use with the North Star Horizon computer and Micro Disk System.

North Star's Pascal software may be used as a program development tool, or may be configured to run custom application programs in turnkey mode. When used for program development, the Pascal software requires at least 48K of RAM memory and a minimum of two single-density or one double-density drive. When used as a turnkey system to run applications programs, North Star Pascal requires as little as 24K of RAM and one single-density or double-density drive. $49.

North Star Computers, 2547 Ninth Street, Berkeley, CA 94710.

CIRCLE 279 ON READER SERVICE CARD

SOFTWARE CALCULATES GRADE AVERAGES

This Student Grading System calculates grade averages for marking period reports in addition to formulating grading curves and norms. Written in BASIC programming language on SOL hardware, the total package, including documentation, source, and media, is priced at $150.00.

Resource Software International, Inc., 140 Sylvan Avenue, Englewood Cliffs, N.J. 07632, (201) 947-6104.

MAILING LIST PROCESSOR FOR 6800

PerCom Data Company announced the availability of a mailing list program for 6800 computers using PerCom LFD-400 mini-floppy disk drives. Written in BASIC, the program may be used to create and maintain mailing list files, including revision, packing and sorting; and to print, copy or display selected file records (mailing labels). The operator has wide latitude in specifying what are to be the common characteristics of the labels to be printed from a given file.

The PerCom Mailing List Processor requires 24K bytes of memory, and either the PerCom Super BASIC or Southwest Technical Products (SWTP) 8K BASIC (version 2.3) interpreter. $99.95.

PerCom Data Company, 318 Barnes, Garland, TX 75042, (214) 272-3421.

CIRCLE 280 ON READER SERVICE CARD

NORTH STAR INCOME TAX MANAGER

TCD Incorporated is offering a TAX program intended for use by individual taxpayers. This program summarizes the 1978 form 1040 and Schedule A (Itemized Deductions) in a format that follows the IRS forms. The important features of the Income Tax Manager allow the following operations: itemize deductions, complete tax forms and, modify entries.

The program written in North Star BASIC will run in a minimum of 32K. Diskette plus manual $24.95.

TCD Incorporated, P.O. Box 58742, Houston, TX 77058, (713) 486-0291.

CIRCLE 281 ON READER SERVICE CARD

ON-LINE SOFTWARE FOR WHOLESALE DISTRIBUTORS

The system was developed by Mini-Computer Systems, Inc., to meet the varied management information requirements of a wholesale distributor. This on-line system consists of four subsystems; order processing, inventory control, cash management and sales reporting. The Wholesale Distributor System may be interfaced to the Company's MICAPS general accounting software packages; general ledger and financial reporting, accounts payable, accounts receivable and payroll. The system, written in BASIC, is completely upward compatible within the MICOS product line operating under the MICOS operating system.

The Wholesale Distributor System is customized to the specific needs of each end user by having the user select from a "shopping list" of options which allows an MCS systems engineer to generate a customized system easily and quickly. All data entry screen formats are customized to appear in the same format as the user's present documents.

Mini-Computer Systems, Inc., 525 Executive Boulevard, Elmsford, New York 10523.

CIRCLE 282 ON READER SERVICE CARD

ORGANIZATIONS

NATIONAL SPACE INSTITUTE

NSI is a non-profit organization centering its activities around educational and scientific guidelines designed to promote the exploration and utilization of space. As its objectives NSI has committed itself to continued space exploration and the use of this knowledge for our benefit.

National Space Institute, 1911 N. Fort Myer Dr., Suite 408, Arlington, VA 22209, (703) 525-3103.

CIRCLE 283 ON READER SERVICE CARD

MAGAZINES, JOURNALS

THE COMPUTING TEACHER

The Computing Teacher, formerly the **Oregon Computing Teacher**, will be published six times during the 1979-1980 academic year. It will focus on the instructional use of computers at all levels, but particularly at the precollege level. The organization behind the publication, The Oregon Council for Computer Education, will become an "umbrella" for regional and state organizations, similar to the National Council of Teachers of Mathematics. $8 per year.

David Moursund, c/o Dept. of Computer Science, University of Oregon, Eugene, OR 97403.

CIRCLE 284 ON READER SERVICE CARD

NEWSLETTER

Datasearch Incorporated is now publishing Computer Opportunities, a monthly newsletter of career ideas and strategies for the enterprising computer professional. It covers the current and promising business opportunities such as consulting, software packages, contract programming, systems houses, dealerships, services and microcomputer enterprises.

Mailed monthly, yearly subscriptions are $36.00 (check, Visa, Mastercharge) with an unusual 90-day (3-issue) cancellation privilege for complete immediate refund or credit.

Datasearch Incorporated, 4954 William Arnold Road, Memphis TN 38117, (901) 761-9090.

CIRCLE 285 ON READER SERVICE CARD

THE SOURCE

Subscription orders are now being accepted for the independent user newsletter dedicated solely to the Exidy Sorcerer. The $15.00 subscription (overseas $25) price includes all ten issues of volume one, and the first issue will be available about July 1. The SOURCE will include items of general interest to Sorcerer owners, such as program listings, how-to-do-it articles, hardware and software reviews, and letters from readers, sharing their discoveries and experiences with the Sorcerer.

ARESCO, P.O. Box 1142, Columbia MD 21044.

CIRCLE 286 ON READER SERVICE CARD

MINICOMPUTER SOLUTIONS

DDC Publications announces a new report to address the problems mini- and microcomputer users experience.

Early subjects will include audits and audit trails; tape and disk cleaning, repair and certification; renting equipment for short term projects; hiring programmers, data entry operators and machine operators; buying supplies; identification and solution of site problems such as low voltage and static; storage of floppies, printouts, disk and tape; scheduling efficiencies and more.

Minicomputer Solutions is published monthly. Subscription rates are $48 for 1 year, $70 for 2 years and $88 for 3 years.

DDC Publications, 5386 Hollister Ave., Santa Barbara, CA 93111, (805) 964-7448.

CIRCLE 287 ON READER SERVICE CARD

BOOKS AND BOOKLETS

ALLTECH MANAGEMENT GUIDE

Alltech's new report, **How to Shop for Computer Products**, provides business managers with an approach for operating successfully in the high-technology information handling industry. This 12-page guide presents Alltech's 7-step management approach for comparing high-technology products, evaluating information handling alternatives, intelligent selection of vendors, and analyzing trends and issues. The report looks at the computer industry from a business manager's viewpoint, not a computer technician's. $5.00 (prepaid).

Alltech Publishing Company, 212 Cooper Center, Pennsauken, N.J. 08109, (609) 662-2122.

CIRCLE 288 ON READER SERVICE CARD

TRS-80™ T-PAL
Programming Amateur's Letter
THE "DO-IT-YOURSELF" SOFTWARE NEWSLETTER
FOR TRS-80 OWNERS
Published Monthly, We'll Teach You All The Latest Wrinkles — How To Get The Most Out Of Your Computer
Graphics • Games • Personal Business • And Much More!
$24 per year . . . or write for FREE DETAILS
THE MAIL MART
Box 11102C, San Francisco, CA 94101

CIRCLE 161 ON READER SERVICE CARD

TRS-80 SOFTWARE

- 4K Level 1 • 4K Level II • 16K Level II • 32K DOS 2.1
- Z80 machine level software—applications & utilities
- Customized software—unique no risk policy
- Package prices from less than 50¢ per program
- Games-personal resource & information management
- Educational-Small Business-Scientific & Engineering
- Now available—Dust covers—Special Offer
- International inquiries welcome • Free Brochure

BRUNSWICK COMPUTER SOFTWARE
P. O. Box 792 • Moncton, N. B. • Canada • E1C 8N6

CIRCLE 194 ON READER SERVICE CARD

STARFLEET ORION

A specially designed SF TACTICAL BATTLE GAME for your PET, TRS-80 or APPLE Computer.

The man called Sudden Smith watched the five blips on his screen spread out to meet the enemy. Two freighters converted into something like battlewagons, powerful but slow, and three real cruisers: the most powerful group of warships ever seen near the Promethean system — except for the Stellar Union fleet opposing them. Everyone was calling it Starfleet Orion, though it existed for only this day. It was life or death, and, after the object lesson on the planet Spring, everyone knew it.

STARFLEET ORION is a complete game system

- rule book
- battle manual
- cassette
- ship control sheets
- program listings

Includes 2 programs, 22 space ship types, and 12 playtested scenarios. Game mechanics are extremely simple, but play is exciting, challenging, and rich in detail. **Specify PET (8K) or TRS-80 (level II, 16 K) ($16.95) - or APPLE II, 24K version ($18.95 including color and sound).**

Ask your local dealer or send your check to:

Automated Simulations
Department R
P.O. Box 4232
Mountain View, CA. 94040

California residents please add 6% sales tax

CIRCLE 120 ON READER SERVICE CARD

DPMA'S ABC'S OF DP

An updated edition of its popular "ABC's of DP" is now being published by Data Processing Management Association. The eight-page, 5½ by 8½ inch booklet serves as an introduction to the field of information processing, and is intended mainly for primary and secondary school students.

The booklet describes various computer operations, such as input, processing and output. It explains programs and programming languages and outlines the duties of computer personnel — programmer, systems analyst, data base administrator, computer operator, data recording clerk and keypunch operators. It contains a list of selected references for additional source material, including periodicals, other associations, computer manufacturers and government agencies. $20 per copy (minimum order: 100)

DPMA International, 505 Busse Highway, Park Ridge, IL 60068, (312) 825-8124.

GUIDE TO PERSONAL COMPUTING

The Guide to Personal Computing, published by Personal Computing Vendors, Computer Stores and Catalog Houses, Publications About Personal Computers, Directory of Vendors, and Product Profiles.

Alltech Publishing Company, 212 Cooper Center, Dept. 1, North Park Drive & Browning Road, Pennsauken, N.J. 08109, (609) 662-2122.

CIRCLE 288 ON READER SERVICE CARD

PRENTICE-HALL BOOKS

Prentice-Hall, Inc. is offering a 15-day free trial on publications relating to the computer industry. Some of the titles include the recently published **Software Design for Microcomputers, The Current Trend Series, Data Processing with Applications, Introduction to Computer Programming with BASIC Language,** and **A Primer on Pascal.**

Prentice-Hall, Inc., Englewood Cliffs, N.J. 07632.

CIRCLE 289 ON READER SERVICE CARD

TEACHING LAW WITH COMPUTERS

A new book containing a collection of essays, **Teaching Law with Computers,** has been published for EDUCOM, The Interuniversity Communications Council, Inc. by Westview Press. The book contains a collection of essays on Teaching Law with Computers. In a typical exercise, a court room situation is simulated in which the student plays the part of a judge ruling on objections. Other chapters in the book describe: the instructional objectives of computer-based exercises of law; the types of exercises used at the University of Minnesota; and activities organized by EDUCOM to assist law professors who want to share computer-based material. $15. EDUCOM members, 40% discount.

Teaching Law with Computers: A Collection of Essays by Russell Burris, Robert Keeton, Carolyn P. Landis, and Roger K. Park, are available from

EDUCOM, P.O. Box 364, Princeton, N.J. 08540 (609) 921-7575, or, from Westview Press, Boulder, Colorado.

CIRCLE 290 ON READER SERVICE CARD

BUYERS GUIDE

A new Buyers Guide of microcomputer software, accessories, and supplies is available. Up to the minute releases on software and accessories for the Apple II and the TRS-80 as well as a wide range of computer supplies are listed. The guide is updated weekly.

The Buyers Guide is free, but please include 50c postage.

Wallace Electronics, Inc., 4921 N. Sheridan Rd., Peoria, IL 61614, (309) 692-2616.

CIRCLE 291 ON READER SERVICE CARD

1979 COMPUTER-ORIENTED BIBLIOGRAPHY

For the 7th consecutive year, more than 200 new books were published on computing topics. All are listed in the 12th Edition of the **Annual Bibliography of Computer-Oriented Books,** published by the University of Colorado.

Notable in this year's listing is the increased quantity and quality of books on the subjects of structured design and distributed processing. In addition, there are eight new books on management of data processing. The category on advanced programming contains 62 books. Ten new books were added, including two new volumes in Yeh's series on **Current Trends in Programming Methodology.**

Computing Newsletter, Box 7345, Colorado Springs, CO 80933.

CIRCLE 292 ON READER SERVICE CARD

PET MACHINE LANGUAGE GUIDE

Abacus Software announced the availability of the PET Machine Language Guide. This manual is intended to help the PET owner who would like to progress beyond the PET's native language, BASIC. Included are sections on using the PET's input and output routines, clocks and timers, floating point, fixed point and ASCII number conversion routines, built-in arithmetic function all from machine language programs. $6.95.

Abacus Software, P.O. Box 7211, Grand Rapids, MI 49510.

CIRCLE 293 ON READER SERVICE CARD

"Hang It All." Funniest puzzle out. Brand new. Placed on sale everywhere, August 15, 1891. Advance orders reached 500,000! Sells itself. Pleases Papa, Mamma laughs, Tommy tries it, Kittie can do it. $5.00 worth of pure fun for 15c. Agents wanted; sell hundreds daily. Mailed postpaid on receipt of price.
PARKER-WENDELL Co., Mfrs. Minneapolis, Minn.
Can You Do It?
Trade Supplied by A. G. SPALDING & BROS., Chicago, New York and Philadelphia.

CATALOG OF SCIENCE MATERIALS

Edmund Scientific's new catalog lists thousands of items such as telescopes, microscopes, optical devices, lasers, solar and heat devices, magnets, electronic items, tools, unique lighting items, slides and much more. Something for everyone. Catalog free.

Edmund Scientific Co., Edscorp Building, Barrington, N.J. 08007, (609) 547-3488.

CIRCLE 294 ON READER SERVICE CARD

MINICOMPUTER SUPPLIES CATALOG

MISCO's Spring issue mail order catalog features lower prices, plus a special introductory offer on name-brand flexible disks. The free catalog offers a complete range of quality minicomputer accessories and supplies: magnetic media, storage items, paper, labels, cables, ribbons, paper tape, computer room aids, terminal ribbons and print wheels, books, tools. Free.

MISCO INC., 963 Holmdel Road, Box 399A, Holmdel, New Jersey 07733, (201) 946-3500.

CIRCLE 295 ON READER SERVICE CARD

CATALOG OF DP SUPPLIES

A new catalog of data processing supplies is now available at no charge from American National Supply Corp. "The Easy Reference to Essential DP Supplies" is a valuable reference guide for both large and small users of discs, diskettes, digital cassettes, mag tapes, ribbons, labels, binders, storage systems and furniture. It is distinguished by an in-depth systems compatibility chart for disc packs, cartridges and printer ribbons, and a subdivision of several qualified manufacturers of magnetic media. Also featured is a new trouble-shooting service backed by field engineering experts. Free.

ANSCO, P.O. Box 2259, Gardena, CA 90247, (800) 421-1270.

CIRCLE 296 ON READER SERVICE CARD

MISCELLANEOUS

DIGITAL CASSETTE FOR MICROS

This digital cassette for microcomputers is designed as a replacement for standard audio cassettes. The MISCO cassette gives consistent, long-lasting recording. 1600bpi tested, quality digital tape provides ten minutes of recording and is leaderless for instant play. Each cassette stores in a protective plastic storage box.

MISCO INC., 963 Holmdel Road, Box 399B, Holmdel, New Jersey, (201) 946-3500.

CIRCLE 297 ON READER SERVICE CARD

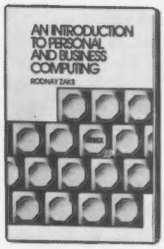
SYBEX

THE LEADER IN
MICROCOMPUTER EDUCATION

PRESENTS

BEST-SELLING BOOKS

Used by Universities and Industry worldwide (ten languages)



C200 - AN INTRODUCTION TO PERSONAL AND BUSINESS COMPUTING
Rodnay Zaks, 250 pp
A comprehensive introduction to small computers, their peripherals, and what to select. **$6.95**

C201 - MICROPROCESSORS: FROM CHIPS TO SYSTEMS
Rodnay Zaks, 416 pp
The basic text on all aspects of microprocessors and the assembly of a system. **$9.95**

C202 - PROGRAMMING THE 6502
Rodnay Zaks, 250 pp
A complete introductory programming text for the 6502. **$10.95**

D302 - 6502 APPLICATIONS BOOK
Rodnay Zaks, 200 pp
Connecting a 6502 board to the outside world: from home alarm to music and industrial control. **$12.95**

C207 - MICROPROCESSOR INTERFACING TECHNIQUES
A. Lesea & R. Zaks, 416 pp
How to interface a microprocessor to external devices: from keyboard to ADC to floppy disk, including standard busses. **$11.95**

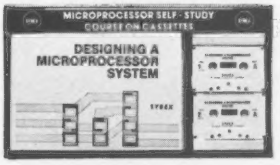
X1 - MICROPROCESSOR LEXICON, 125pp
All the definitions of the microprocessor world in a convenient pocketbook format. **$2.95**

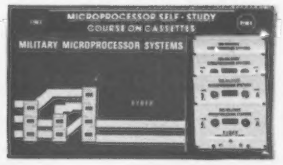
AVAILABLE AT BOOKSTORES, COMPUTER STORES, AND ELECTRONIC SHOPS EVERYWHERE!

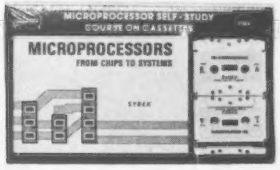
SELF-STUDY COURSES ON CASSETTES

"The time-efficient way to learn"™

Self-study courses include two to eight audio-cassettes and a special book. They offer the fastest way to learn the topic covered (from ½ to two days). Highly effective.







1 - INTRODUCTORY - SHORT (2.5 hrs ea)
S1-INTRODUCTION TO MICROPROCESSORS $29.95
S2-PROGRAMMING MICROPROCESSORS $29.95
S3-DESIGNING A MICROPROCESSOR SYSTEM $29.95
S10B-INTRODUCTION TO PERSONAL AND BUSINESS COMPUTING $21.90

2 - INTRODUCTORY - COMPREHENSIVE (10 to 12 hrs ea)
SB1-MICROPROCESSORS $59.95
SB2-MICROCOMPUTER PROGRAMMING $59.95

3 - SPECIALIZED (4.5 to 6 hrs ea)
SB3-MILITARY MICROPROCESSOR SYSTEMS $49.95
SB5-BIT-SLICE $49.95
SB6-INDUSTRIAL MICROPROCESSOR SYSTEMS $49.95
SB7-MICROPROCESSOR INTERFACING $49.95

TO ORDER

By Phone: 415 848-8233, Visa, M.C., Amer Express.
By mail: Include payment.
Shipping: add $1.50 per book (UPS) or 65¢ (4th class - allow 4 weeks). Double for cassettes and overseas.
Tax: In California add tax.

FREE DETAILED CATALOGUE

SYBEX
Dept. CC6
2020 Milvia Street
Berkeley, CA 94704
Tel.: (415) 848-8233-Telex: 336 311
See You NCC - Booth 31

NAME_____POSITION_____
COMPANY_____
ADDRESS_____
CITY_____STATE/ZIP_____
☐C200 ☐C201 ☐C202 ☐C207 ☐D302 ☐S1 ☐S2
☐S3 ☐S10B ☐SB1 ☐SB2 ☐SB3 ☐SB5 ☐SB6 ☐SB7
☐charge my ☐Visa ☐M.C. ☐Amer Express
Number_____Exp. date_____
Signature_____ ☐Send Catalogue

CIRCLE 104 ON READER SERVICE CARD

Puzzled about the best ways to use your computer?

$3.95
61 pp. softbound
from Creative Computing Press

Be A Computer Literate

by Marion J. Ball and Sylvia Charp

This is the most basic, introductory book on computers ever put together for instructional use. Its full-color diagrams, drawings, photos and large, explicit type make this book a pleasure to read.

Let Creative Computing

4-Year Cumulative Index

We've cross-referenced articles that have appeared in both *Creative Computing* magazine and the *Best of Creative Computing Vols. 1 and 2*, hence, the current source of every article is listed.

Articles are classified by subject area and listed by title and author. Over 2000 separate items are included. The index does not include a cross-reference to author.

The index was put together by Jane Fletcher on a DECsystem-10 using the text editor and runoff (with a Diablo 1620).

Price for this blockbuster of an index is just $1.00 postpaid, $1.25 for first class delivery, $2.00 foreign. Orders must include payment (no bank cards, COD's, or orders to be billed).

The Best of BYTE

$11.95
386 pp. softbound
from Creative Computing Press

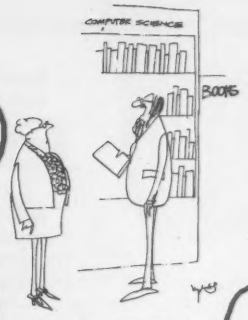
This is a blockbuster of a book containing the majority of material from the first 12 issues of *Byte* magazine. The 146 pages devoted to hardware are crammed full of how-to articles on everything from TV displays to joysticks to cassette interfaces and computer kits. But hardware without software might as well be a boat anchor, so there are 125 pages of software and applications ranging from on-line debuggers to games to a complete small business accounting system. A section on theory examines the how and why behind the circuits and programs, and "opinion" looks at where this explosive new hobby is heading. [6F]

Computer Rage

This fun and educational new board game is based on a large-scale multiprocessing computer system. The object is to move your three programs from input to output. Moves are determined by the roll of three binary dice representing bits in a computer. Hazards include priority interrupts, program bugs, decision symbols, power failures and restricted input and output channels. Notes are included for adapting game for school instruction. A perfect introductory tool to binary math and the seemingly-complex computer. [6Z]

Binary Dice

Now, the same dice used in Computer Rage can be purchased separately. Three binary dice (red, green and blue) in a ziplock bag. $1.25 postpaid [3G].



"...No thanks, ... just scanning..."

The Colossal Computer Cartoon Book

The best collection of computer cartoons ever! 15 chapters of several hundred cartoons about robots, computer dating, computers in the office, etc. Great gift item. 128 pp. softbound $4.95

$8.95
336 pp. softbound
from Creative Computing Press

$8.95
328 pp. softbound
from Creative Computing Press

The Best of Creative Computing

The first two years of *Creative Computing* magazine have been edited into two big blockbuster books. *American Vocational Journal* said of Volume 1, "This book is the 'Whole Earth Catalog' of computers." [6A] Volume 2 continues in the same tradition. "Non-technical in approach, its pages are filled with information, articles, games and activities. Fun layout."—*American Libraries.* [6B]

put it all together

Artist and Computer

by Ruth Leavitt

This unique art book covers a multitude of computer uses and the very latest techniques in computer-generated art. In its pages, 35 artists explain how the computer can be programmed either to actualize the artist's concept (such as the visualization of fabric before it is woven) or to produce finished pieces. Over 160 examples, some in full color. [6D]

To Order

Use the bound-in order form or send your check for books plus $2.00 shipping and handling per order (Foreign: $1.25 per book) to Creative Computing, P.O. Box 789-M, Morristown, NJ 07960. NJ residents add 5% sales tax. Visa or MasterCharge are acceptable also. For faster service, call in your bank card order toll free to:

800-631-8112

(in NJ call 201 540-0445)

Reviews

Stephen B. Gray

Understanding FORTRAN, by Michel Boillot. West Publishing Co., 50 West Kellogg Blvd., Box 3526, St. Paul, MN 55165. 499 pages, paperback $11.95. 1978.

FORTRAN 77, by Harry Katzan, Jr., Van Nostrand Reinhold Co., New York. 223 pages, hardcover $16.95. 1978.

A FORTRAN Coloring Book, by Roger E. Kaufman. The MIT Press, Cambridge, Mass. 292 pages, paperback $6.95. 1978. (Available through the Creative Computing Book Service.)

FORTRAN, by Samuel L. Marateck. Academic Press, New York. 687 pages, paperback $9.95. 1977.

Computing With FORTRAN, by Donald M. Monro. Edward Arnold Ltd., Publishers, London. U.S. Distributors: ISBS Inc., Box 555, Forest Grove, OR 97116. 248 pages, paperback $10.95. 1977.

These five FORTRAN books represent quite a spectrum of styles and presentations. Three are college textbooks, one is a reference book, and the fifth is for kids.

As for the three texts, Monro's has a typewritten text that may bother a few people; Boillot's uses a nice semi-informal style; and, Marateck provides a huge book, an inch and a quarter thick, with much white space resulting from a rather restrictive format.

Boillot's **Understanding FORTRAN** has a "You Might Want To Know" section in each chapter, answering such questions as: "Just how fast do computers operate?", "Can I use the same format for more than one READ statement?"; and, "What languages are better than FORTRAN for implementing structured programs?". Each chapter has Exercises, including a Self Test with answers, and Programming Problems.

The book is divided into 13 chapters: Computers and Computing, Flowcharting, Introduction to FORTRAN in two parts, Counting, Accumulation, Data Representation, One-Dimensional Arrays, Two- and Three-Dimensional Arrays, Functions, Subroutines, File Processing, and Structured Programming.

The presentation is straightforward with the first program on calculating payroll, found on page 10. It uses simple statements such as WRITE PAY, HRS. Flowcharting is used as a lead-in to programming; and, the first real FORTRAN program doesn't appear until page 49, after a lot of preliminary groundwork has been covered.

Coding forms and punched-card FORTRAN are introduced in chapter 3, which is heavy on the format codes.

This book is very well thought out, thorough, and detailed. All the flowcharts are annotated; and, there are a great many illustrations of parts of programs, memory arrangements, and sample outputs.

Katzan's **FORTRAN 77** is not a text, but is a reference book on the new standard, FORTRAN 77. The style is comparable to a military-handbook, with paragraph numbers such as 10.3.2. This book is clear, concise, and will be quite boring to all but "die-hard must-know" FORTRAN people.

This is a book to read after you've read one of the other four reviewed here, as it is not a teaching text. The dustcover says it is "indispensable not only to computer personnel who use FORTRAN on a daily basis and whose organizations have invested millions of dollars in FORTRAN programs, this book is an absolute must for scientists, engineers, managers, business analysts, and everyone else who needs to keep pace with FORTRAN language developments."

The book provides examples, semantic descriptions, and syntactical forms that give specifications of new FORTRAN facilities as well as those of the old 1966 FORTRAN standard.

Kaufman's **A FORTRAN Coloring Book** is, mirabile dictu, entirely handlettered, every single word. The style is apparently aimed at the preteens, with such advice as "Don't think of the equal sign as being an equal sign but think of it as being a gozzinta sign." Kaufman uses dialect at times, such as "...itsa nota gonna fit alla teenetzia drawer!"; seldom-used words such as "fescenine," "funny" terms such as KVETCH and 30 JAIL=LITLGY-NIXON; jokes throughout; and, drawings of anthropomorphic animals and birds, each saying something, via comic-strip balloons, that are supposedly helpful.

The basic text is 189 pages long. The sample problems and exercises, most of them quite clever, take 72 pages; and, eight pages are taken up with FORTRAN in a Nutshell.

This book may be funny to children aged 11 ± 2, and provide as painless a vehicle as possible for learning FORTRAN. However, although I must admit finding some of the material genuinely funny, many adults, especially those saturated with the idea of traditional textbooks, may not be amused.

Marateck's **FORTRAN** is a college textbook that takes advantage of, or suffers due to the use of the right-hand pages for pictorial material on programming, and the left-hand pages for explanatory text, depending on your point of view. This sounds interesting, but results in a great deal of white space, especially on the right-hand pages, and to a lesser degree on the left, about 30 to 40 percent of the book.

However, there is a lot of information here, delivered in a rather formal writing style except for the use of "you" in many places. One plus is that all the examples are taken from Teletype originals; a minus is that some are not clearly printed, as though a new ribbon should have been used.

The text is chockful of examples, although the first one is a little formidable, showing a coding form and then five FORTRAN STATEMENT cards (page 13). The introduction to FORTRAN programs is very gradual, starting with examples of using statements such as WRITE, then going on to a simple addition, then performing a multiplication, and so on, with a slow and easy buildup.

There are 10 to 20 problems at the end of each chapter, with no answers given in the book.

This is a fine book that weighs all of three pounds and is thus not easy to misplace; students will not think kindly of Marateck as they trot around the campus lugging this monster, which is just half the size and weight of the Manhattan Yellow Pages.

Monro's **Computing With FORTRAN** is perhaps the only FORTRAN text ever written for the person who already knows BASIC. Throughout the book are boxes showing FORTRAN features and the corresponding ones in BASIC.

The rationale is given on page 1, which says in part, "...a special-purpose language to mention here is BASIC because it is worth learning first. BASIC enables beginners to assimilate the elementary principles of programming with a minimum of fuss and is designed to facilitate transition to the greater rigour of such languages as FORTRAN. This course has been made general enough for any student of FORTRAN with a suitable mathematical background, but is it particularly suitable to follow BASIC."

This is a clear, concise book, starting off painlessly with a three-line program on page 8, then getting into constants and expressions and such, and not presenting another program until page 30.

The seven chapters are on Introduction; Calculations in FORTRAN; Program Organization and Control; Functions and Subroutines; Arrays, Subscripts and Storage; Special Variable Types; and, Input and Output. The text is typewritten; the headings are typeset.

All five authors are academics: Boillot is at Pensacola

Did you miss any issues of creative computing?

The following back issues of Creative Computing are still available. But they won't be for long, so order today if you want to fill in the holes in your collection. Our programming articles are timeless so you're not buying obsolete information.

Prices on 1976 and 1977 issues are $2.00 each postpaid or three for $5.00. 1978 and 1979 issues are $2.50 each postpaid, three for $7.00 or six for $12.00 postpaid.

Vol. 2, No. 5—Sep/Oct 1976
Computer programming contests, Russian computing, Do-it-yourself computer poetry (3 articles), two games: Watchman and Delmar, four feature reviews of "Computer Power and Human Reason," Computers in elections, two great stories.

Vol. 3, No. 1 - Jan/Feb 1977
Equipment profiles: Teletype model 43, IMSAI 8080, SWTPC 6800, Computers in the movies, All about Electronic Funds Transfer, Centerfold "Computer Tree": Babbage to 370/158, A approach for analyzing discontinuous events, unsolvable complex problems, the Wooly Mammoth problem, ten outstanding problems for computer solution, Games: Drag, Masterbagels, Strike 9.

Vol. 3, No. 4 - Jul/Aug 1977
Guide to selecting a microcomputer. Write your own CAI, Part 2. Computers in medicine and health care. Dwyer: "8-Hour Course in Basic- Part 1," "Thinking Strategies- Part 3." Sherlock Holmes and Charles Babbage. Four new games.

Vol. 3, No. 5 - Sep/Oct 1977
A dynamic debugging system for 8080 assembly language, bibliography of "limits to growth" models, Dywer: 8-hour course in Basic-Part 2, Programming approaches to solving complex equations, Electronic information exchange, Symmetric art with your computer, in-depth reviews of 5 microcomputer BASICs, software technology music system, Games: Nomad, Rotate, Lissajous.

Vol. 3, No. 6 - Nov/Dec 1977
Programming techniques- Part 1. CAI. Topics in Logic. Three 8080 8K BASIC evaluations. Smart electronic game reviews. How computers can write final exams. Mastermind II and Otherllo computer games. Profile of the Alpha 1 and Alpha 2 for the TDL Xitan.

Vol. 4, No. 1 — Jan/Feb 1978
File structures, 16-bit computers, LOGO language, Murphy's laws, review of Radio Shack TRS-80 and Heath H8, World model, biorythms, how to write a simulation, Hart sort algorithm, 3 games, 8-Hour Basic Course - Part 4.

Vol. 4, No. 4 - Jul/Aug 1978
Reviews of Commodore PET, Apple II, Atari computer, Video games, interfacing to the real world: 5 articles, business computing: 4 word processing systems, ROM section: 7 articles, backgammon game, bar code.

Vol. 4, No. 5—Sep/Oct 1978
Equipment profiles: TRS-80, Exidy Sorcerer, Bally Arcade, PolyMorphic 8813, Merlin Video Display preview of nine new personal computers. Accounts receivable systems, All about PASCAL, real world games, a real time clock to build, PET cassettes, special education features, new software: Star Wars, Hex,

Vol. 4, No. 6—Nov/Dec 1978
Subject index and file index in BASIC, consumer computers buying guide, electronic game reviews, critical path analysis, mailing label programs, robot programming, experiment in teaching strategic thinking, evaluations of Northstar Horizon, CP/M operating system and backgammon computers, columns on Apple II PET and TRS-80, plus game section including "Corral", "Joust" and "Puzzle".

Vol. 5, No. 1 - January 1979
Computers in fiction; Survey of Educator's Attitudes; K-State; How to Hide Your Basic Program; World Chess Championship Computer; Compleat Computer Catalog, Microchess for the TRS-80; Exidy Sorcerer; Ohio Scientific Superboard II; Robots in Fiction; Help for the Weary Taxpayer; A Counterfeit Cursor for your PET; Medical Audit Time.

Vol. 5, No. 2 - February 1979

Evaluations: Electric Pencil, Heathkit H-8, Computer Music Records. Computer Games: Gold Mine, Atom-20. Computerized Sports Predictions, Multiple Regression Analysis Simplified, Value of Computers in Education, Budget Management System, Help for the beleaguered consumer.

For faster service, use your Visa or Master Charge and call our toll-free order line:

800-631-8112
(In NJ, call 201-540-0445)

Please send me:

$2/each, 3 for $5, 6 for $9

- ☐ Sep/Oct 1976
- ☐ Jan/Feb 1977
- ☐ ~~Mar/Apr 1977~~
- ☐ ~~May/Jun 1977~~
- ☐ Jul/Aug 1977
- ☐ Sep/Oct 1977
- ☐ Nov/Dec 1977

$2.50/each, 6 for $12

- ☐ Jan/Feb 1978
- ☐ ~~Mar/Apr 1978~~
- ☐ ~~May/Jun 1978~~
- ☐ Jul/Aug 1978
- ☐ Sep/Oct 1978
- ☐ Nov/Dec 1978
- ☐ Jan 1979
- ☐ Feb 1979
- ☐ Mar 1979
- ☐ Apr 1979

- ☐ Volume 1 bound, $10
- ☐ Volume 2 bound, $10

Total amount _____ ☐ VISA ☐ MASTER CHARGE

☐ Cash, check, or M.O. enclosed

Card No. _____

Expiration date _____

Name _____

Address _____

_____

City _____ State _____ Zip _____

Return form to: CREATIVE COMPUTING,
P.O. Box 789-M, Morristown, New Jersey 07960

Junior College in Florida; Katzan is Chairman of the Computer Science Department at Pratt Institute; Kaufman is a professor at The George Washington University and a lecturer at MIT; Marateck is at NYU; and, Munro is at the Imperial College of Science and Technology in London.

The BASIC Cookbook, by Ken Tracton. TAB Books, Blue Ridge Summit, PA. 140 pages, paperback $4.95. 1978.

The back cover says that "with this easy-to-use book, you'll quickly learn how to understand BASIC." Well, it isn't easy to use, and you won't learn BASIC very quickly from it. Because it's almost entirely, as the front cover put it, "a complete dictionary of all BASIC statements, commands, and functions—with programming examples and flowcharts."

If you can learn a language from a dictionary, this may be the book for you. But most people will find it somewhat baffling. After a nine-page introduction to BASIC, which includes an 18-line guess-the-number program, the book goes right into the 118-page dictionary, starting off with ABS and ending with "variables."

The author, "an experienced computer programmer and software developer," has done a lot of work in writing a great many programming examples, often several to demonstrate how a certain statement is used. And although some people might possibly learn from this dictionary approach, several dozen BASIC books are available that teach the language by gradually presenting statements in a much more meaningful order, and in significant groups. Tracton's book does have a place on your shelf, but only as a reference book, to be bought after you've already learned BASIC elsewhere.

Basic Microprocessors and the 6800, by Ron Bishop. Hayden Book Co., Inc., Rochelle Park, N.J. 270 pages, paperback $11.95. 1979.

This book, by the manager of technical training at Motorola's Semiconductor Group, actually consists of two books written at very different levels.

The first four chapters, on basic electronics, logic elements, number systems, and digital arithmetic, are very simple, at the high-school level. Chapter 5, on the basics of microcomputers, begins to get a little complicated. From then on, so much complex material is thrown at the reader that he may well put the book down, somewhere around page 85, and leave it there.

Chapter 7 is on addressing modes, and immediately begins to tell you much more than you want to know, or are perhaps capable of digesting at the rate it is presented. And if somehow you manage to get through all of that chapter OK; the Chapter 8, on M6800 Software, is gonna getcha, unless you're one smart cookie.

This is a prime example of "too much too soon," and can be recommended only to very bright bit-hackers, or to electronics engineers, most of whom can skip the first four chapters.

Corporate Planning and Modeling With SIMPLAN, by R. Britton Mayo and Social Systems, Inc. Addison-Wesley Publishing Co., Reading, MA. 474 pages, paperback $8.95. 1979.

This computer programming manual teaches the SIMPLAN language, a planning and modeling system that complements Thomas H. Naylor's "Corporate Planning Models," also published by Addison-Wesley.

The first installation of SIMPLAN was completed for Monsanto in 1974, and it has since been installed in over 50 in-house computers and is also available worldwide on several of the major timesharing networks. According to Dr. Naylor, SIMPLAN "provides the capabilities necessary for effective planning, modeling, econometric analysis, forecasting, reporting, data management, and security control in an easy-to-use computer-based system."

Chapter I of the book provides an overview of the planning process, and describes the areas in which computer technology may be helpful. Chapter II discusses the various types of corporate models used in planning. Chapter III outlines the capabilities most commonly required to support the planning process, and provides an overview of SIMPLAN structure.

Chapter IV contains basic information for new users, and Chapters V through XII each cover a particular aspect of the planning support function, such as a database, reports, text editor, security, forecasting, and graphics.

Business Automation Reference Service, Alltech Publishing Co., 212 Cooper Center, Pennsauken, N.J. 08109. (609) 662-2122.

Alltech's new service, Business Automation, as described in their literature, "provides management: 1. answers for automating a business by using computer technology, 2. alternate solutions in information handling, 3. low-cost, one-stop shopping for the range of computer related products, 4. dynamic coverage, not static snapshot reports, 5. management reports instead of endless, bewildering engineering treatises."

There are four individual services. With each one, the subscriber receives two looseleaf reference volumes and twelve monthly updating bulletins. The service on Computer Equipment covers general purpose computers, complete systems, and major peripherals. The service on Peripherals covers terminals, key-to-storage, data displays, OCR, and modems. The other services cover Office Equipment and Computer Software. Each service has five parts: 1. Management Reports, 2. Vendor Directories, 3. Buyer's Guides, 4. Monthly Newsletter, and 5. Inquiry Service.

The services are not cheap; a one-year subscription to each costs $130 or all four cost $390. A subscription to any one also includes 12 issues of The APC Tablet, Alltech's monthly newsletter.

We took a look at the first month reports (February 1979) and found a rather mixed bag. The Reports to Management for the most part consist of edited copies of press releases sent out by each manufacturer. Most of this information can readily be found in Datamation or Infosystems (which are, of course, free) although it is not so neatly categorized. Also in the Reports to Management were two surveys, one of disk equipment and one of word processing equipment. The disk survey curiously included only two computer manufacturers (DEC and HP) and twelve add-on vendors. Also curious was the absence of some of the largest disk manufacturers (Ampex, CDC, and Shugart). Because a manufacturer does not reply to a questionnaire, does not necessarily mean that they are no longer in business.

The word processing survey was somewhat more complete, but also omitted some majors (Wang, Xerox, A-B Dick, Qyx, Varityper, and IBM). Also no microcomputer-based systems were included in any of the reports.

On a more positive note, the vendor directories are a real time saver. Instead of leafing through scores of magazines or the inevitable 3-year-old S&P Directory, here's a handy guide to vendors in each product area.

We haven't seen a complete buyers' guide included with each of the four services, but the sample format sent us looks comprehensive and quite useful.

Also for your $130, you get access to Alltech's Inquiry Service to "answer your question on a particular vendor or product."

In summary, the absence of coverage of micro-based products lowers the value of this service for small businesses. Medium and larger companies and organizations may well find this a valuable complement to (or replacement for) Datapro, MIS or other informal information gathering procedures.

(Alltech does publish a guide to Personal Computing for $25 which covers some 600 products. Their advice is "look before you leap." Good advice for any field!) —David H. Ahl

Computer Stores And The Sale Of Small Business Computers by Stephen H. Seidman. Strategic Business Services, 4320 Stevens Creek Blvd., Suite 215, San Jose, CA 95129. 119 pages, paperback. $750.00. 1979.

No, that is not a typo in the price; this report really costs $750.00. The report is aimed at Fortune 500 type companies

who want to keep abreast of new markets. But it may also be of interest to entrepreneurs thinking about opening a computer store which may require an investment of $100,000 and up. If a $750 report can help insure success it is well worth the money, but can it? That's what we tried to find out.

The report examines the computer store market and its segmentation by type of customer (small business, schools, home & hobby, and industrial customers). It also gives breakdowns by revenues of exisitng stores (computers, peripherals, software, publications, maintenance, etc.). Future projections are optimistic but extremely general (unit sales for the entire USA).

It goes on to discuss the franchise programs of the three leaders, Byte Shops, Computerland, and The Computer Store. Investment requirements are detailed in terms of startup costs, inventory and accounts receivable. Conclusion: better have $100,000 in your pocket or a line of credit from the bank before you start.

Six case histories are discussed including one failure, perhaps as instructive as any of the successes. Why Marin Computer Center, an open-to-the-public educational facility (CREATIVE COMPUTING, April, 1979) was included, I really don't know. It's not a store and not likely to be the model for someone entering the business. Nevertheless, four successful examples are discussed in moderate depth.

The competitive environment is superficially discussed, although in this area, a budding store owner is best advised to do an in-depth study of his local geographic area because of tremendously wide variations within a region or even a single county.

Hardware and software vendors are discussed along with their retailer policies and, while the report is relatively complete with respect to hardware vendors (17 majors), the software section is very weak with only two vendors mentioned. The report points out that hardware manufacturers provide less than 10% of the software so we find the absence of a good list of software vendors a most unfortunate omission. [The authors of the report responded to this point by saying that they found very little good business software available.]

Nine case histories of businesses using computers purchased from computer stores round out the text portion of the report. The Appendices range from acceptable (hardware vendors, fairs and conventions, and organizations) to poor (software vendors) to unacceptable (consultants—only two listed).

Is the report worth $750? If you're serious about opening a store and don't know what to expect, it may well be. However, it's not a panacea; you'll still have to do some good solid local market research and have some excellent business talent if you expect to succeed.

—DHA

NOW AVAILABLE

BASIC SOFTWARE

For SOL-IIA and PET-8K

Tape Data Query $50
(file management system)
cassette with users manual and reference card

General Pack I $11
(Checkbook balancer, Tic-Tac-Toe, metric conversion)

General Pack II $19
(Space Patrol, Biorhythm, Battlestar, One-armed Bandit)

Financial Pack I $13
(Loans, Depreciation, Investments)

Financial Pack II $13
(Mortgage and Loan Amortization, future projections, risk analysis)

Statistics Pack I
(Mean and Deviation, Distribution, Linear Correlation and Regression, Contingency Table analysis)

Game Pack I $20
(Basketball, Object Removal, Bowling, Darts, Gopher)

Game Pack II (children-educational) $13
(Arithmetic God, Addition Dice, Travel)

FOR THE KIM-I

PCROS — A real time operating system $50
in the 1K Kim RAM.
Includes: Assembly listing; Cassette with users manual
Schematic for relay control board
All programs on high quality cassette tape

Send check or money order to

H. GELLER COMPUTER SYSTEMS
Dept. C
P.O. Box 350
New York, N.Y. 10040

(New York State Residents add applicable sales tax)

CIRCLE 189 ON READER SERVICE CARD

TRS-80 USERS

Centronics P1 Micro Printer 450.00
Same as Radio Shack "Quick Printer" with cable!

Mini-Floppy Disk Drives 339.00
Includes case and power supply. 2 drive cable $25.00.

Centronics 779 Printer with tractor feed $1179.00
Includes cable for connection to Radio Shack expansion interface.

Expanded Mail List, on diskette 59.95
Multiple file and full update capability. Alpha and zip code. Rapid sorting into labels or lists. Full select and suppression capabilities on up to a 10 digit key. Redundancy check and much more!

Send for free catalog of TRS-80 software and hardware.

Cost Effective Computer Services

P.O. Box 3543 Hobbyist Hours 5-11 p.m.
Grand Junction, CO 81501 Phone#
303-243-3629

CIRCLE 137 ON READER SERVICE CARD

Save More Than 20%

NORTH STAR — XITAN

The smartest computers at the smartest price.

Double Density	List	Our Price
HORIZON-1-16K kit,	$1599	$1279
Assembled & tested,	$1899	$1519
HORIZON-2-32K kit,	$2249	$1799
Assembled & tested,	$2549	$2039
PASCAL for NORTH STAR on Disk		$49
Powerful NORTH STAR BASIC		....FREE

XITAN Computers — NOW — With QUAD DENSITY DISKS!
Famous XITAN Software & Basic ...FREE
HORIZON & XITAN are S-100, Z-80 — THE BEST!
INTERTUBE II Terminal, $ 995 $ 795

NEW: Our VIDEO BOARD CODE on Disk! Now you can run our computers on a TV!
SAVE HUNDREDS $$$$
TV Code on Disk $10, Listing...Free
Business Software, Terminals, Printers, Computers in stock & special-ordered other brands at good discounts. Ask! Which Computers are best?
BROCHURE.....FREE

AMERICAN SQUARE COMPUTERS
Kivett Drive, Jamestown, NC 27282
(919) 883-1105

CIRCLE 190 ON READER SERVICE CARD

TRS-80 SOFTWARE

Disassembler: Read, write, and copy system tapes. Display and modify memory contents. Disassemble Basic, Disk Basic, and system tapes into Z80 Nemonics. Search for strings in memory. Much More! Includes 32 pages of documentation and other information. For 16K Level II $19.95

Real Time Clock: Places the real time clock from the expansion interface on the screen continuously like Disk Basic. Allows use of Level II programs at the same time. Can be set, turned on or off. Level II 16K and Expansion Interface required.....$12.95

System Tape Duplicator: Copy your system format tapes. Includes verify routine. For Level II.....$12.95

Coming Soon: Packer, Backgammon, and more!

Special Requirements: Write or call. Dealer Inquires Invited.

Kansas residents add sales tax.

COTTAGE SOFTWARE
614 N. Harding Wichita, KS 67208
316-682-0206

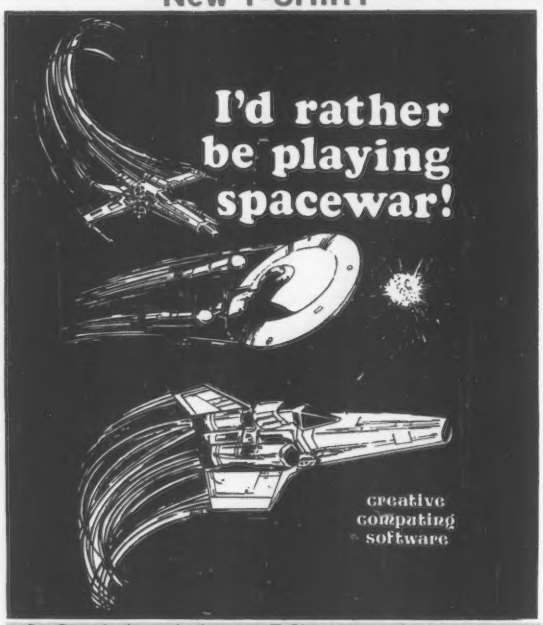
CIRCLE 193 ON READER SERVICE CARD

Index To Advertisers

Reader Service	Advertiser	Page
116	Advanced Computer Products	65
106	Advanced MicroComputer Systems	100
117	Affordable Business Systems	142
118	AJA Software	97
114,115	Alpha Supply Co.	98,100
190	American Square Computers	159
119	Apple Computer Co.	15
120	Automated Simulations	151
112	Basic Business Software Co.	119
121,122	Berkeley Medical Data Assoc., Inc.	115,144
101	The Bottom Shelf, Inc.	80-81
194	Brunswick Computer Software	151
123	Business Computing Press	146
124	California Computer Systems	8-9
125	CAP Electronics	84
126	Chatsworth Data Corp.	7
127	Cload Magazine	101
128	Compumax Associates	79
*	Computer Consultants	134
110	Computer Corner NJ	148
129	Computer Corner White Plains	150
130	Computer Information Exchange	148
131	Computer Mart of Orange	74
188	Computer Services	143
132	Computer Store of Santa Monica	77
133	Computer Systems Design	120
134	Computerworld	107
135	Connecticut MicroComputer	129,130,133,136
136	Computronics	125
*	Conver Corp.	140
137	Cost Effective Computer Services	159
193	Cottage Software	159
138	Cromemco	1
139	Crown Publishers	44
140	Datasearch	121
141	Data Decisions Corp.	123
102	Diablo Systems	37
*	Digital Press	19
142	Electronic Control Technology	132
149	Electronic Systems	75
150	Exidy	16-17
151	Frazer & Assoc.	134
152	Gaudeus	141
143	GRT	31
202	Garvey, Martin & Samson	79
189	H. Geller Computer Systems	159
154	Hayden Book Co.	27
153	Holistic Data Systems	143
108	Innergio	144
155	Interactive Microware, Inc.	20
156	Jade Computer Products	45
157	JHM Marketing	138
*	Judge Electronics	10
159	KLH Systems	146
160	Lifeboat Associates	122
*	The Logic Store	132
191	Mad Hatter Software	91
161	The Mail Mart	151
148	Malibu Design Group	49
147	Marketline Systems	136
162	Meca	25
196	Micro Architect	148
144	Micro-Ap	5
163	MicroComputer Devices	85
164	MicroComputer World	122
165,166	MicroFantastic Programming	51,147
167	MicroMail	137
168	Micro Mike's	84
169	MicroPro International	2
*	MicroSoft	21
170	Midwest Scientific	39
171	Mini Micro Mart	54-55
113	Mountain Hardware	41
198	Muse Co.	51
*	National Small Computer Show	69
172	Nestar Systems	140
199,200	Netronics R&D, Ltd.	77,87
145	North Star Computers	11
103	Ohio Scientific	C4
111	Osborne & Assoc.	115
173	Otto Electronics	68
174	Percom	135
105,192	Personal Software	C3,139,128,44
175,195	Personal Programming Services	139,120
176	Practical Applications	74
107	Programma International	121
109	Quality Software	142
177	RACETcomputes	138
*	Rainbow Computing, Inc.	119
179	SSI Publications	73
146	Small Business Computers Magazine	29
181	Small System Software	126
182	Smoke Signal Broadcasting	13
203	Software-80	145
183	Southwest Technical Products Corp.	C2
104	Sybex	153
184	Tarbell Electronics	135
197	Terminal Sales & Development	43
185	Total Information Services	123
186	TRS-80 Software Exchange	127
187	Vista	131
*	Creative Computing	
	Sensational Software	58-59
	More Basic Computer Games	89
	Adventure Games	149
	Creative Computing Books	154-155
	Back Issues	157

*Direct Correspondence Requested.

New T-SHIRT



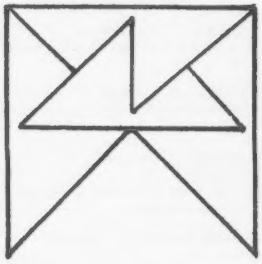
On Creative's exclusive new T-Shirt, "I'd rather be playing Spacewar," spacecraft from Star Trek, Star Wars and Battlestar Galactica team up together. The shirt has white lettering on a black background and is available in adult sizes S,M,L,XL; childrens sizes S,M,L. All cotton, made in USA. When ordering, specify design and size. $5.00 postpaid USA, $6.00 postpaid, foreign. No COD's. Send payment and order to Creative Computing, P.O. Box 789-M, Morristown, NJ 07960.

Answers to "Puzzles & Problems."

1. The answer is "Time."

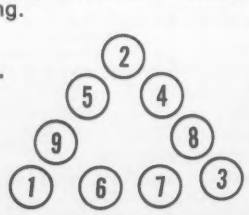
2. Start at any dot, count six dots and place a coin on the sixth dot. Remember which dot you **started** counting from as that's the dot you will want to place your second coin on. Start your second coin on a dot that will allow you to come to rest on the first dot. Start the third coin so that it comes to rest on the dot you started your second coin from. Continue like this for the rest of the coins.

3.

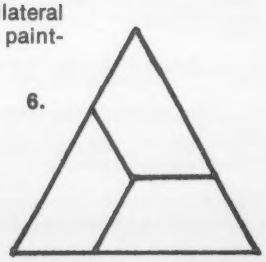


4. There are 31 different equilateral triangles in Ector Pendragon's painting.

5.



6.



creative computing

Subscriptions

☐ New ☐ Renewal ☐ Address Change

Term	USA	Foreign Surface	Foreign Air
12 issues	☐ $ 15	☐ $ 23	☐ $ 39
24 issues	☐ 28	☐ 44	☐ 76
36 issues	☐ 40	☐ 64	☐ 112
Lifetime	☐ 300	☐ 400	☐ 600

Name _____
Address _____
City _____
State _____
Zip _____

For a change of address, please attach old label here. Without it, we cannot assure uninterrupted service.

☐ Cash, check, or M.O. Enclosed
☐ Please bill me ($1 billing fee will be added)
Foreign orders must be prepaid.

☐ Visa/BankAmericard ☐ Master Charge
Card No. _____
Exp. _____

Allow 8 Weeks for delivery

679CC

creative computing

Books, Merchandise & Subscriptions

Name _____
Address _____
City _____
State _____ Zip _____

☐ Cash, Check or M.O. Enclosed
☐ Visa/BankAmericard ☐ Master Charge
Card No. _____ Exp _____
☐ Please bill me ($1 billing fee will be added)
Books & foreign orders must be prepaid
Allow 8 weeks for delivery

Quan	Cat#	Description	Price

$1 USA, $2 Foreign Shipping Charge _____
NJ residents add 5% sales tax _____
Total _____

For faster service call toll-free
800-631-8112
(In NJ call 201-540-0445)

679CC

June 1979 • Expires September 10, 1979

(Please Print)
Name _____
Title _____
Address _____
City _____
State _____ Zip _____

Please answer each question by checking box.

1. Your age
   a ☐ under 20 c ☐ 30-39 e ☐ 50-59
   b ☐ 20-29 d ☐ 40-49 f ☐ 60 plus

2. What is your job title?
   a ☐ President/Owner/Director/Chairman
   b ☐ Systems Analyst/Software Designer/Programmer
   c ☐ Engineer/Technical Staff/Mathematician
   d ☐ Consultant f ☐ Faculty
   e ☐ Student (full time) g ☐ Student (part-time)

3. What computer-related products would you recommend, select and/or purchase for your business?
   a ☐ Medium/Large computer e ☐ Teleprinter
   b ☐ Minicomputer f ☐ Peripherals
   c ☐ Microcomputer g ☐ Books & Publications
   d ☐ CRT Terminal

4. How Many people read your copy of Creative Computing?
   a ☐ One b ☐ Two c ☐ Three d ☐ More

creative computing

Please circle each number for which you wish information

101	106	111	116	121	176	181	186	191	196
102	107	112	117	122	177	182	187	192	197
103	108	113	118	123	178	183	188	193	198
104	109	114	119	124	179	184	189	194	199
105	110	115	120	125	180	185	190	195	200
126	131	136	141	146	201	206	211	216	221
127	132	137	142	147	202	207	212	217	222
128	133	138	143	148	203	208	213	218	223
129	134	139	144	149	204	209	214	219	224
130	135	140	145	150	205	210	215	220	225
151	156	161	166	171	226	231	236	241	246
152	157	162	167	172	227	232	237	242	247
153	158	163	168	173	228	233	238	243	248
154	159	164	169	174	229	234	239	244	249
155	160	165	170	175	230	235	240	245	250
251	256	261	266	271	276	281	286	291	296
252	257	262	267	272	277	282	287	292	297
253	258	263	268	273	278	283	288	293	298
254	259	264	269	274	279	284	289	294	299
255	260	265	270	275	280	285	290	295	300

June 1979 • Expires September 10, 1979

(Please Print)
Name _____
Title _____
Address _____
City _____
State _____ Zip _____

Please answer each question by checking box.

1. Your age
   a ☐ under 20 c ☐ 30-39 e ☐ 50-59
   b ☐ 20-29 d ☐ 40-49 f ☐ 60 plus

2. What is your job title?
   a ☐ President/Owner/Director/Chairman
   b ☐ Systems Analyst/Software Designer/Programmer
   c ☐ Engineer/Technical Staff/Mathematician
   d ☐ Consultant f ☐ Faculty
   e ☐ Student (full time) g ☐ Student (part-time)

3. What computer-related products would you recommend, select and/or purchase for your business?
   a ☐ Medium/Large computer e ☐ Teleprinter
   b ☐ Minicomputer f ☐ Peripherals
   c ☐ Microcomputer g ☐ Books & Publications
   d ☐ CRT Terminal

4. How Many people read your copy of Creative Computing?
   a ☐ One b ☐ Two c ☐ Three d ☐ More

creative computing

Please circle each number for which you wish information

101	106	111	116	121	176	181	186	191	196
102	107	112	117	122	177	182	187	192	197
103	108	113	118	123	178	183	188	193	198
104	109	114	119	124	179	184	189	194	199
105	110	115	120	125	180	185	190	195	200
126	131	136	141	146	201	206	211	216	221
127	132	137	142	147	202	207	212	217	222
128	133	138	143	148	203	208	213	218	223
129	134	139	144	149	204	209	214	219	224
130	135	140	145	150	205	210	215	220	225
151	156	161	166	171	226	231	236	241	246
152	157	162	167	172	227	232	237	242	247
153	158	163	168	173	228	233	238	243	248
154	159	164	169	174	229	234	239	244	249
155	160	165	170	175	230	235	240	245	250
251	256	261	266	271	276	281	286	291	296
252	257	262	267	272	277	282	287	292	297
253	258	263	268	273	278	283	288	293	298
254	259	264	269	274	279	284	289	294	299
255	260	265	270	275	280	285	290	295	300

Place
Stamp
Here

creative computing
P.O. Box #2976
Clinton, Iowa 52735

Place
Stamp
Here

creative computing
P.O. Box 789-M
Morristown, NJ 07960

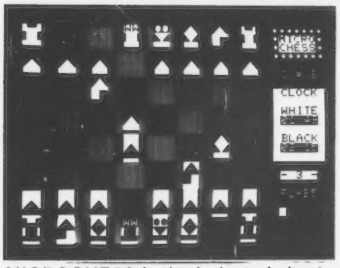
Place
Stamp
Here

creative computing
P.O. Box #2976
Clinton, Iowa 52735

Place
Stamp
Here

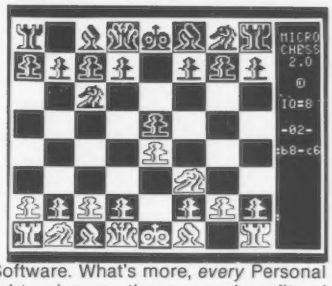
creative computing
P.O. Box 789-M
Morristown, NJ 07960

PET / TRS-80 / APPLE: Personal Software brings you the finest!

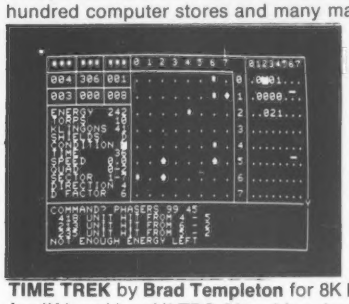


MICRO CHESS

The Industry's First Gold Cassette Over 50,000 Sold



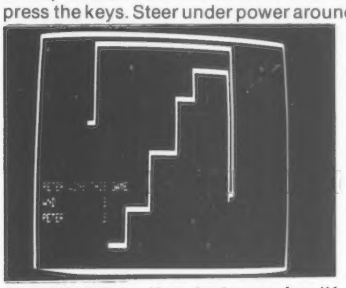
MICROCHESS is the industry's best selling computer game. And no wonder—because MICROCHESS gives you more than just a chessplaying program: A convenient, foolproof set of commands and error checks ... complete instructions in a 5½" by 8½" booklet ... a cassette that's guaranteed to load, with disk versions coming soon ... and several levels of difficulty to challenge you not just once, but time after time. It's available through well over three hundred computer stores and many mail order sources ... always originating from Personal Software. What's more, *every* Personal Software product is selected to give you these same benefits of easy availability, reliable cassettes, readable documentation, a carefully thought out user interface ... and most important, continuing challenge and enjoyment, not just once but time after time. If you haven't already, order your own gold cassette: MICROCHESS, by **Peter Jennings**, for 8K **PET**s, 16K **APPLE**s, and 4K Level I and II **TRS-80**s **$19.95**



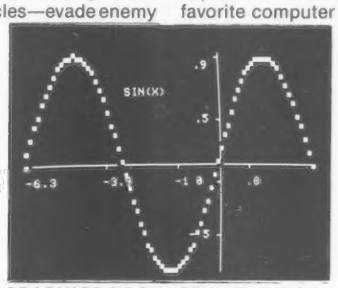
TIME TREK

A Tour De Force In Real Time Action Strategy Games

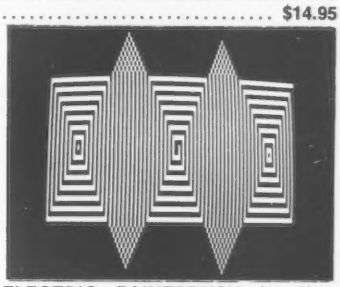
TIME TREK by **Brad Templeton** for 8K **PET**s and **Joshua Lavinsky** for 4K Level I and II **TRS-80**s adds a dramatic new dimension to the classic Star Trek type strategy game: REAL TIME ACTION! You'll need fast reflexes as well as sharp wits to win in this constantly changing game. Be prepared—the Klingons will fire at you as you move, and will move themselves at the same time, even from quadrant to quadrant—but with practice you can change course and speed, aim and fire in one smooth motion, as fast as you can press the keys. Steer under power around obstacles—evade enemy shots as they come towards you—lower your shields just long enough to fire your phasers, betting that you can get them back up in time! With nine levels of difficulty, this challenging game is easy to learn, yet takes most users months of play to master. ADD SOUND EFFECTS with a simple two-wire hookup to any audio amplifier; the TRS-80 also produces sound effects directly through the keyboard case, to accompany spectacular graphics explosions! You won't want to miss this memorable version of a favorite computer game **$14.95**



BLOCKADE by **Ken Anderson** for 4K Level I and II **TRS-80**s is a real time action game for two players, with high speed graphics in machine language. Each player uses four keys to control the direction of a moving wall. Try to force your opponent into a collision without running into a wall yourself! A strategy game at lower speeds, BLOCKADE turns into a tense game of reflexes and coordination at faster rates. Play on a flat or spherical course at any of ten different speeds. You can hear SOUND EFFECTS through a nearby AM radio—expect some razzing if you lose! **14.95**



GRAPHICS PACKAGE by **Dan Fylstra** for 8K **PET**s includes programs for the most common 'practical' graphics applications: PLOTTER graphs both functions and data to a resolution of 80 by 50 points, with automatic scaling and labeling of the axes; BARPLOT produces horizontal and vertical, segmented and labeled bar graphs; LETTER displays messages in large block letters, using any alphanumeric or special character on the PET keyboard; and DOODLER can be used to create arbitrary screen patterns and save them on cassette or in a BASIC program **$14.95**



ELECTRIC PAINTBRUSH by **Ken Anderson** for 4K Level I and II **TRS-80**s: Create dazzling real time graphics displays at speeds far beyond BASIC, by writing 'programs' consisting of simple graphics commands for a machine language interpreter. Commands let you draw lines, turn corners, change white to black, repeat previous steps, or call other programs. The ELECTRIC PAINTBRUSH manual shows you how to create a variety of fascinating artistic patterns including the one pictured. Show your friends some special effects they've never seen on a TV screen! **$14.95**

WHERE TO GET IT: *Look for the* ***Personal Software™*** *display rack at your local computer store. If you can't find the product you want, you can order direct with your VISA/Master Charge card by dialing* ***1-800-325-6400*** *toll free (24 hours, 7 days; in Missouri, dial 1-800-3426600). If you have questions, please call* ***617-783-0694****. Or you can mail your order to one of the addresses below, as of the dates shown.*

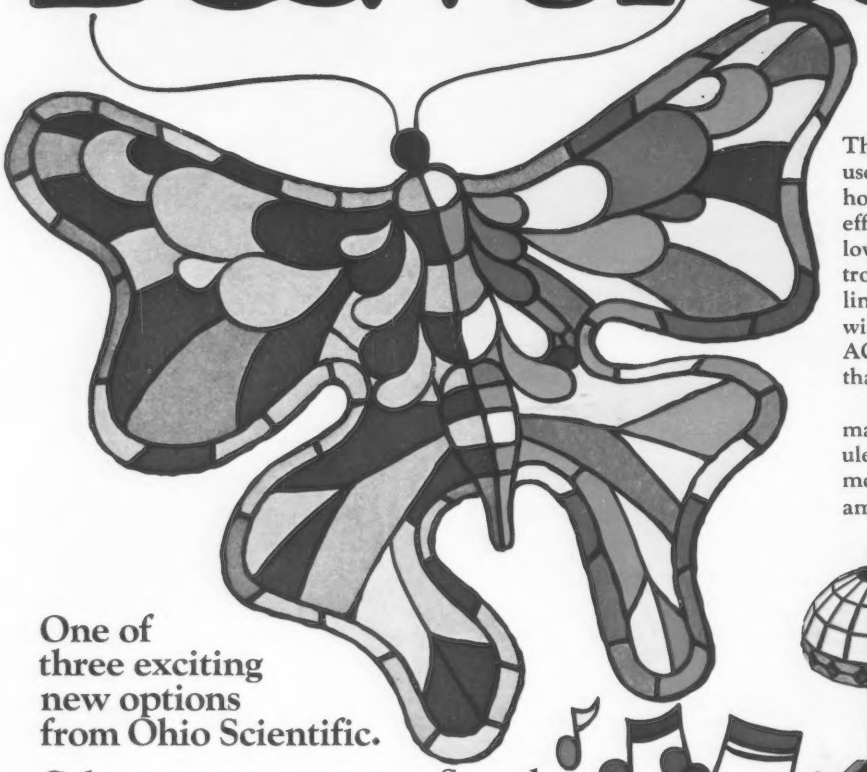
Until July 1: P.O. Box 136
Cambridge, Mass. 02138

Personal Software™

After July 1: 592 Weddell Dr.
Sunnyvale, Calif. 94086

CIRCLE 105 ON READER SERVICE CARD

B&W or Color?



One of three exciting new options from Ohio Scientific.

Color. With it there is a big difference. And now, Ohio Scientific offers a lustrous 16 color option on all its C2 Series Computer Systems, past and present. New orders for C2-4P and C2-8P's can now request the color option. Upgrade kits are available for all existing C2's. When coupled with the C2's demonstrated high resolution graphics, the new color display is striking.

The relatively easy add-on of color and other options discussed here are interfaced through the new 540 B video board and are realized without extensive modification or excessive cost because the C2 family of computers feature exceptional "design for the future" modular construction that permits one sector of the computer to be modified without affecting other sectors.

Sound.
The sound option further enhances enjoyment of the C2's while broadening their scope of applications. Games of logic and dexterity now seem to come alive when sound pops out from on-screen happenings.

This new option is implemented through the new 542 Rev B keyboard available with new C2 orders or as part of an upgrade kit. In addition to a standard tone generator, this new board also contains a D/A (digital to analog) converter that takes advantage of the power and ultra high speed of the C2's 6502 microprocessor to enable users to generate both limited band-width speech and complex musical chords.

AC-12 Remote AC Control System.

This unique option enables a C2 user to create a computerized wireless home control facility with simple effort and at heretofore unheard of low cost. The AC-12 provides a control signal on the home's AC power line not unlike the manner in which wireless intercoms function. The AC-12 will plug into any C2 computer that has the new 540 B video board.

The basic system contains a command console and four remote modules. The remotes can be appliance modules that can switch up to 15 amps, lamp modules that can provide on-off, dimming and brightening, or wall switch modules. The AC-12 has a special Home Control OS-65D V 3.0 Mini-Floppy Disk Operating System that provides a wide range of capabilities not the least of which is "Foreground and Background" operation. This allows the computer to monitor time and inputs for the Home Control System, while running other BASIC programs!

New options:

Color and Sound Option on C2-4P and C2-8P . . . . . Add $200

CA-11B 540B color video board for system upgrades (does not include 542B sound keyboard) $225

CA-11C 540B color video board and 542B sound keyboard. (For upgrades) $299

AC-12 Remote AC control system, including console, four remotes and software. For use on any system with a 540B video board $175

Color. Sound. AC Remote Control. Three more examples of Ohio Scientific's continuing enhancement of its computer products and user benefits.

Contact your local Ohio Scientific dealer.

OHIO SCIENTIFIC

1333 S. Chillicothe Road • Aurora, Ohio 44202

(216) 562-3101

CIRCLE 103 ON READER SERVICE CARD